Diagnosis-Driven Physical Examination of the Knee

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# The Diagnosis-Driven Physical Exam of the Knee Checklist

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<th>Maneuver</th>
<th>Notes</th>
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<td><strong>Inspection</strong></td>
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<tr>
<td>• Abnormal gait</td>
<td></td>
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<tr>
<td>• Alignment deformity (varus, valgus, neutral)</td>
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<tr>
<td>• Bony abnormalities</td>
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<tr>
<td>• Quad atrophy</td>
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<td>• Erythema</td>
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| Palpation – Knee extended|                                                                        |
| • Effusion              |                                                                        |
| • Quad tendon           |                                                                        |
| • Patellar tendon       |                                                                        |
| • Tibial tubercle       |                                                                        |
| • Patellar facet        |                                                                        |
| • Patellar grind (Quad apprehension) test |                                                                    |

| ROM                      |                                                                        |
| • 0 - 135 degrees        |                                                                        |
| • crepitus               |                                                                        |

| Palpation – Knee flexed at 90 degrees |                                                                        |
| • Medial joint line tenderness      |                                                                        |
| • Medial collateral ligament (MCL)  |                                                                        |
| • Pes anserine bursa               |                                                                        |
| • Lateral joint line              |                                                                        |
| • Lateral collateral ligament (LCL) |                                                                      |
| • Iliotibial band - Noble Compression test |                                                                  |

| Provocative testing        |                                                                        |
| • Anterior drawer (ACL at 90) |                                                                  |
| • Posterior drawer (PCL at 90) |                                                                   |
| • Lachman’s test (ACL at 30)  |                                                                   |
| • Valgus stress (MCL)        |                                                                   |
| • Varus stress (LCL)         |                                                                   |
| • McMurray (medial and lateral compression) |                                                              |
| • **Thessaly test**          |                                                                   |
| • **Squat test**             |                                                                   |

**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

**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
MUSCULOSKELETAL ORGANIZATIONAL SCHEME

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

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
## Key Knee History: Most Common Diagnoses in PC

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

### Bonus Conditions

<table>
<thead>
<tr>
<th></th>
<th>ACL tear</th>
<th>MCL tear</th>
<th>Pes anserine bursitis</th>
<th>ITB syndrome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic</strong></td>
<td>Usually under 40</td>
<td>Any age</td>
<td>Middle/Upper age</td>
<td>Any age</td>
</tr>
<tr>
<td><strong>Mechanism of injury</strong></td>
<td>Traumatic/twisting injury (noncontact)</td>
<td>Valgus force to the knee</td>
<td>Overuse/limping</td>
<td>Running, overuse</td>
</tr>
<tr>
<td><strong>Swelling</strong></td>
<td>Yes, within an hour</td>
<td>Yes, medially</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Locking</strong></td>
<td>No, unless concomitant bucket handle meniscal tear</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Location of pain</strong></td>
<td>Nonlocalizable, possibly lateral</td>
<td>Medial knee</td>
<td>Anteromedial aspect of the proximal tibia</td>
<td>Lateral knee</td>
</tr>
<tr>
<td><strong>Instability</strong></td>
<td>Yes</td>
<td>No, unless high grade tear</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
KNEE ANATOMY – 4 LIGAMENTS

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

3 SURFACES

Articular cartilage

Femoral condyle

Tibial plateau

Patellofemoral groove
MENISCUS

- Medial and lateral
- Shock absorber
- Stabilizer

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
KNEE EXAM

• Inspection
  • Abnormal gait
  • Alignment: Varus, valgus, neutral
  • Bony abnormalities
  • Quad atrophy
  • Erythema

• Palpation with knee flexed 90 degrees
  • Joint lines, bony prominences
  • MCL, LCL tenderness
  • ITB, Gerdy’s tubercle
  • Pes anserine bursa

• Palpation with knee extended
  • Evaluate for effusion
  • Quad, patellar tendons, tibial tubercle
  • Patellar facets
  • Patellar grind test

• 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

INSPECTION

Gait

Alignment
  • Normal
  • Varus
  • Valgus

Bony changes

Quad atrophy

Effusion

Standing tests done if suspect meniscal tear and patient doesn’t have significant knee OA
PALPATION WITH KNEE EXTENDED

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

EFFUSION
PALPATION OF PATELLAR FACETS

Note: There is no audio accompanying this video
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

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 x-rays, MRI
• Urgent referral to sports surgeon for arthroscopy
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
ANTERIOR DRAWER FOR ACL

This is a normal exam (no laxity)

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

POSTERIOR DRAWER FOR PCL

This is a normal exam (no laxity)
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%


POSITIVE LACHMAN
VALGUS STRESS FOR MCL AND VARUS STRESS FOR LCL

This is a normal exam (no laxity)

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%
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

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)