KNEE EXAMINATION

If the knee examination is unremarkable or you suspect referred pain, consider examining the hip, ankle, and foot.

GAIT

- Stance phase (heel strike → mid-stance → toe-off)
- Swing phase, stride length
- Smoothness, symmetry, ability to turn quickly
- Antalgic gait (identify point at which pain occurs)
INSPECTION

- While standing:
  - Swelling
    - Popliteal fossa for Baker's cysts
  - Erythema
  - Atrophy
    - Calves
    - Quadriceps
    - Hamstrings
  - Deformities
    - Genu recurvatum (hyperextension)
    - Genu procurvatum (flexion deformity, always abnormal)
    - Genu varum (bow-legged)
    - Genu valgum (knock-kneed)
  - Skin changes and scars

- While supine:
  - Swelling
    - Loss of parapatellar grooves/fossae or swelling extending to the suprapatellar area
      - May occur with knee effusion
    - Localized swelling may indicate bursitis, tendon, or ligament pathology

PALPATION

- With knee extended
  - Temperature (use back of hand)
    - Patella should be cooler than the thigh and tibia
    - Warmth can occur with septic bursitis or inflammatory or septic arthritis
  - Palpate patella
    - Feel undersides by tilting to one side and feeling with fingers or thumb
  - Quadriceps, suprapatellar tendon, patellar ligament, tibial tuberosity
  - Popliteal fossa
  - Pulse
  - Swelling (may be Baker's cysts)
  - Bursae
    - Pre-patellar bursa (just in front of the patella)
    - Superficial infra-patellar bursa (just inferior to the patella, overlying the patellar ligament and under the skin)
    - Deep infra-patellar bursa (behind patellar ligament)
    - Anserine bursa (anteromedial aspect of knee, near medial tibial plateau, composed of Sartorius, gracilis, and semitendinosus tendons)

- With knee flexed to 90°
○ Medial and lateral tibial plateaus
○ Femoral condyles
○ Medial and lateral joint line
○ Medial collateral ligament

● In the figure-of-4 Position (*heel resting on opposite knee*)
  ○ Lateral collateral ligament is easily felt as accord on the lateral aspect of the knee

**Palpation for Effusion**
○ Fluid Wave/Bulge Sign/Milking Test
  ○ *Empty the medial fossa by sweeping hand superiorly and laterally, followed immediately by sweeping down the lateral side*
  ○ A bulge forming in the medial fossa indicating an effusion
○ Fluid Ballotment test
  ○ *With leg extended, grasp the knee just above the patella and apply pressure while squeezing*
  ○ *With the other hand, grasp the medial and lateral parapatellar fossae*
  ○ If ballotable fluid is felt, indicates an effusion
○ Patellar Tap
  ○ *With leg extended, grasp the knee just above the patella and apply pressure while squeezing, pushing any fluid under the patella*
  ○ *Push the patella towards the femur (posteriorly) with the index finger of the other hand*
  ○ If the patellar taps the femur and bounces back up, this is a positive test (best felt in moderate to large effusions)

**RANGE OF MOTION**
*Generally perform active ROM first, followed by passive ROM if active ROM is limited. These may be integrated at terminal range of movement.*

● Active and Passive
  ○ Flexion (135°)
  ○ Extension (more than 10° is abnormal hypermobility)
  ○ Internal and external rotation (best done with knee flexed at 90°)
    ○ Point toes in (internal rotation, normally 30°)
    ○ Point toes out (external rotation, normally 20°)
  ○ Patellar movement
    ○ Push medially and laterally on patella
    ○ Look for hypermobility, or pain or apprehension from dislocation
    ○ Assess patellar crepitus during ROM by placing one hand on patella

**POWER ASSESSMENT**
*Best done by resisted isometric testing with the knee flexed to 90°, with patient resisting examiner’s force*

● Extension
  ○ Push against lower leg toward buttocks with patient resisting force
• Flexion
  ○ Pull lower leg away from buttocks with patient resisting force

SPECIAL TESTS
• Anterior and Posterior Cruciate Ligaments
  ○ Anterior Drawer Test (ACL tear)
    ○ Patient supine, knee flexed at 90°
    ○ Stabilize the tibia with forearms while grasping the upper part with thumbs on either side, and pull the upper tibia forward
    ○ Excess anterior displacement of the tibia compared with the contralateral knee indicates an ACL tear
  ○ Posterior Drawer Test (PCL tear)
    ○ In the same position as the Anterior Drawer Test, push backwards on the upper tibia
    ○ Excess posterior displacement of the tibia compared with the contralateral knee indicates PCL tear

Evidence-Based Medicine: Anterior Cruciate Ligament Tear

Anterior Drawer Test
LR+ 3.8
Diagnostic Value: Ruling in anterior cruciate ligament tear

Lachman Test
LR+ 42
Diagnostic Value: Ruling in anterior cruciate ligament tear

- Stabilize the femur with one hand and grasp the upper tibia with the other hand and try to pull tibia forward
- If there is notable anterior movement of the tibia or no discrete end point, this indicates possible ACL tear

**Medial and Lateral Collateral Ligaments**

- **Medial Collateral Stress Test (MCL Tear)**
  - Patient supine, knee flexed 30°
  - Stabilize the knee and apply a valgus (lateral) force to the lower leg
  - Increased laxity and pain at the MCL indicates torn MCL

- **Lateral Collateral Stress Test (LCL Tear)**
  - Patient supine, knee flexed 30°
  - Stabilize the knee and apply a varus (medial) force to the lower leg
  - Increased laxity and pain at the LCL indicates a torn LCL
- **Menisci**
  - **McMurray's Test** *(Meniscal Tear)*
    - Attempt to elicit pain or a "clunking" sensation by trapping meniscus between femur and tibia
    - Ideally done in one smooth movement
  - **Medial Meniscus**
    - With the patient supine, flex the knee and place one hand over the knee and the other under the foot
    - Externally rotate the foot and apply a varus (medial) force on the lower leg and extend the knee
    - If pain or a palpable or audible click occurs, this indicates a tear of the medial meniscus
  - **Lateral Meniscus**
    - With the patient supine, flex the knee and place one hand over the knee and the other under the foot
    - Internally rotate the foot and apply a valgus (lateral) force on the lower leg and extend the knee
    - If pain or a palpable or audible click occurs, this indicates a tear of the lateral meniscus
  - **Apley's Compression Test** *(Meniscal Tear)*
    - Attempt to elicit pain by trapping meniscus between femur and tibia
    - With the patient supine and the knee flexed to 90°, stabilize the femur with one hand and grasp the heel with the other
    - Using the patient's foot, apply downward pressure while rotating the lower leg internally and externally
    - Apply a varus force/tilt for medial meniscus, and a lateral force/tilt for the lateral meniscus
    - Pain or popping/clicking indicates a meniscal tear

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**Evidence-Based Medicine: Meniscal Tear**

**McMurray's Test**
- Sensitivity 71%, Specificity 71%
- Diagnostic Value: Ruling in meniscal tears

**Apley's Test**
- Sensitivity 61%, Specificity 70.2%
- Diagnostic Value: Ruling in meniscal tears