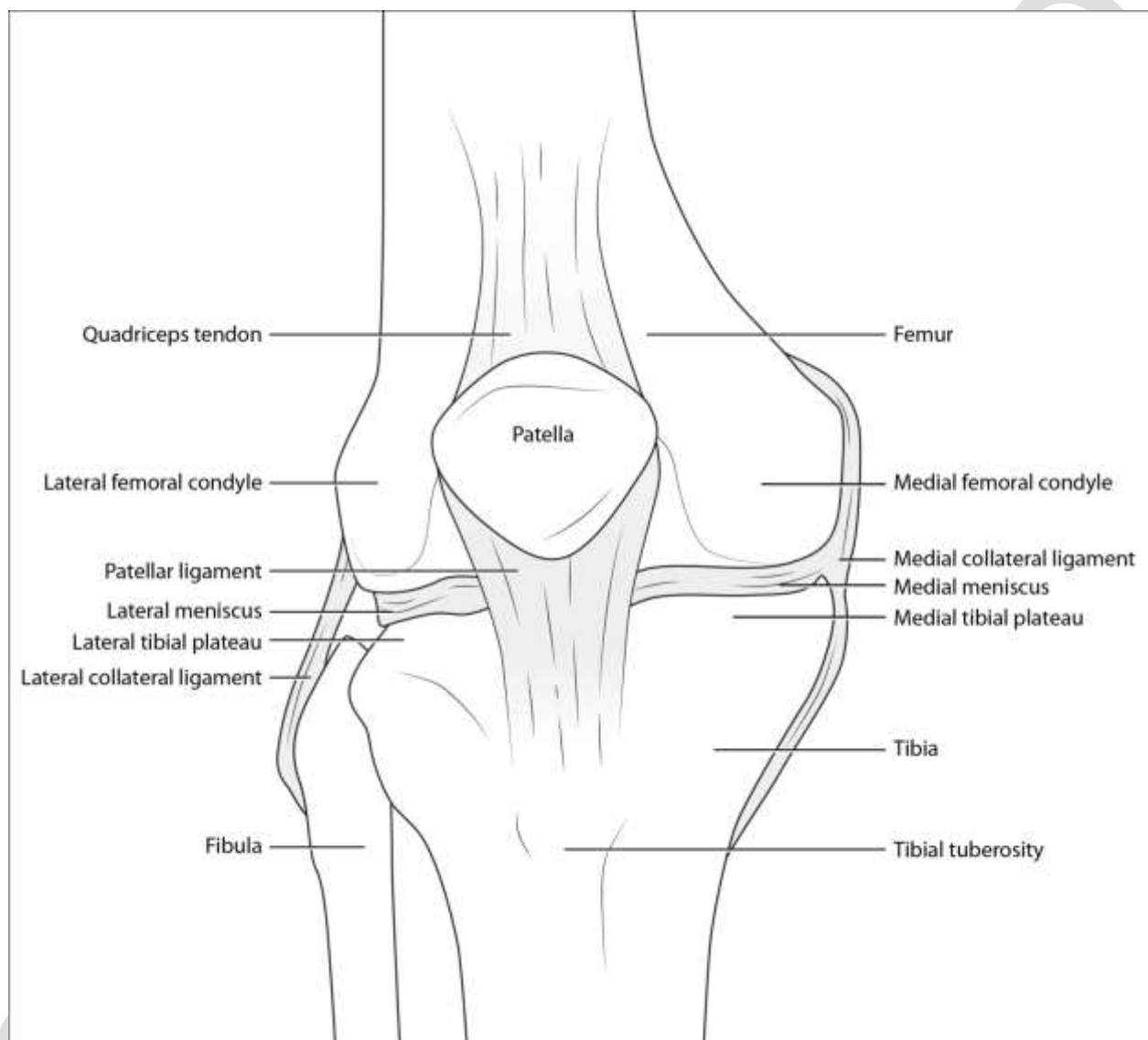


KNEE EXAMINATION

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

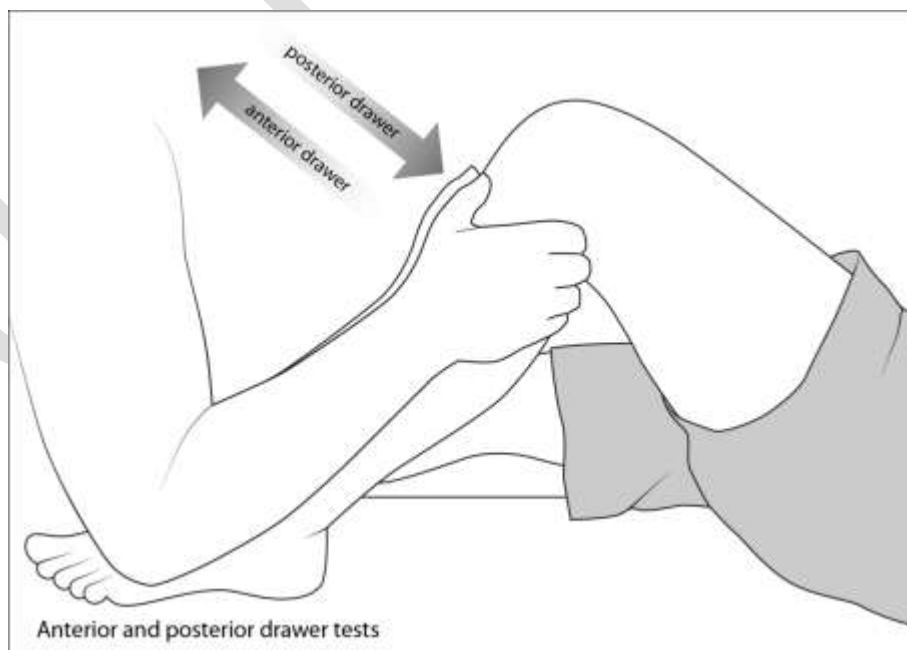
Diagnostic Value: Ruling in anterior cruciate ligament tear

Lachman Test

LR+ 42

Diagnostic Value: Ruling in anterior cruciate ligament tear

Solomon DH et. al. JAMA. 2001;286(13):1610-1620.



- **Lachman Test (ACL tear)**

- *Patient supine, knee flexed at 30°*

- 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**

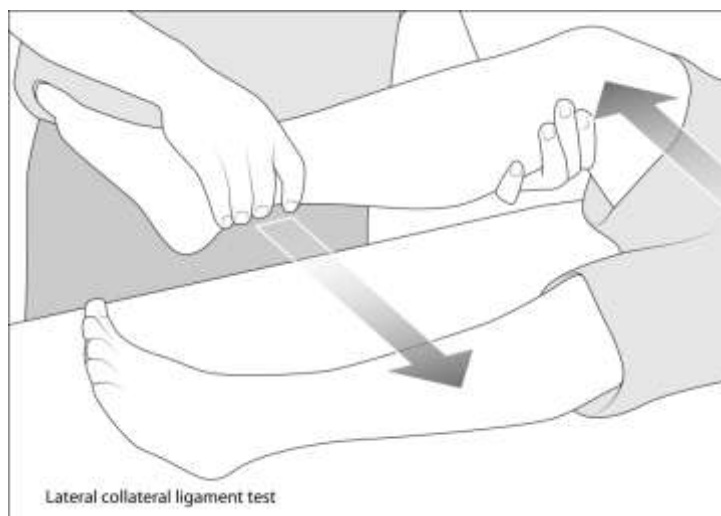
- **Medial Collateral Stress Test (MCL Tear)**

- 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

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

Hegedus EJ et. Al. 2007. J Orthop Sports Phys Ther 37(9):541-550.