

# Approach to a Joint; BASIC SKILLS in Musculoskeletal Exam: Hands on Training Workshop.

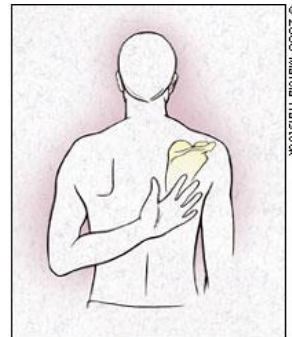
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## MSK Physical Exam Booklet

### Shoulder Exam

#### Active Shoulder Range of Motion

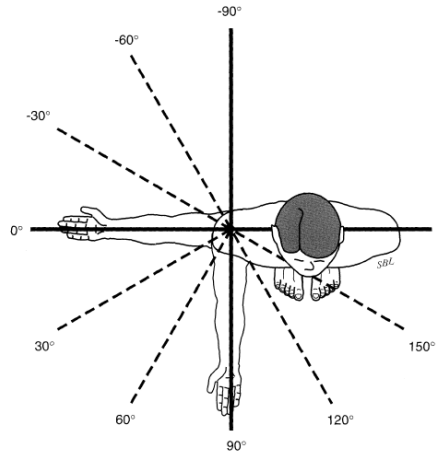
- Trace arc while reaching forward with elbow straight (forward flexion)
  - Should be able to move hand to position over head - normal range is 0 to 180 degrees.
- Reverse direction & trace arc backwards (extension).
  - Should be able to position hand behind their back
- Direct patient to abduct their arm to position with hand above their head
  - Movement should be smooth and painless - Normal range is 0 to 180.
- Abduction and External Rotation:
  1. Direct patient to place hand behind head.
  2. Then, reach as far down spine as possible.
  3. Note extent of reach in relation to cervical spine
  4. Should be able to reach C 7 level.



- Adduction and Internal rotation:
  1. Direct patient to place hand behind back.
  2. Instruct them to reach as high up spine as possible.
  3. Note extent of reach in relation to scapula or thoracic spine.
  4. Should be able to reach lower border of scapula.

## Passive Shoulder Range of Motion

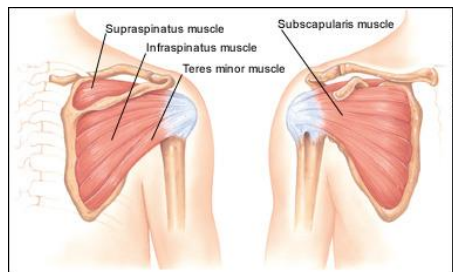
- If pain with active ROM, assess same with passive Range Of Motion.
  - a) Grasp humerus & move shoulder through ROMs described previously.
  - b) Feel for crepitus with hand placed on shoulder.
- Note which movement(s) precipitate pain. Pain/limitation on active ROM but not passive suggests a structural problem with muscles.
- Note limitations in movement.




## The Rotator Cuff

Rotator Cuff muscles and function:

1. Supraspinatus – Abducts shoulder (up to ~ 80 degrees)
2. Infraspinatus – External rotation
3. Teres Minor – External rotation
4. Subscapularis – Internal rotation



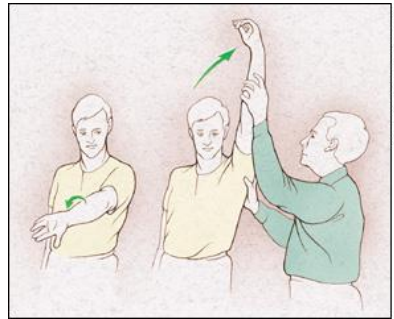
## Rotator Cuff Testing

1. Supraspinatus examination (“empty can” test)
  - a) Patient abducts shoulder 30 degrees, with 30 degrees forward flexion & full internal rotation (i.e. turned so thumb pointing downward).
  - b) Forward flex shoulder, without resistance.
  - c) Repeat w/resistance
  - d) Note that Deltoid responsible for abduction beyond ~ 70 degrees
  - e) If partial tear of Supraspinatus, patient experiences pain & some element weakness with above maneuver. Complete disruption of muscle prevents patient from achieving any abduction
2. Infraspinatus and Teres Minor examination
  - a) Patient slightly abducts (20-30 degrees) shoulders, elbows at 90 degrees.
  - b) Place your hands on outside of their forearms.© 2000 Marcia Harstock
  - c) Direct patient to push arms outward (externally rotate) while you resist.
  - d) Tears in tendon and weakness and/or pain
3. Subscapularis examination
  - a) Patient places hand behind back, palm facing out.
  - b) Patient lifts hand away from back.
  - c) If tendon partially torn, movement limited or causes pain. Complete tears prevent any movement in this direction

# Shoulder Provocative Testing

- **NEER'S TEST:** Tests for Impingement

- 1) Place 1 hand on patient's scapula, & grasp forearm with other. Arm internally rotated (thumb pointed downward).
- 2) Foreward flex arm, positioning hand over the head.
- 3) Pain with this maneuver is a sign of subacromial impingement.



- **HAWKINS' TEST:** Tests for Impingement

- 1) Elevated patient's arm to 90 degrees forward flexion.
- 2) While forcibly internally rotating the shoulder
- 3) Pain with this maneuver suggests subacromial impingement or rotator cuff tendonitis.



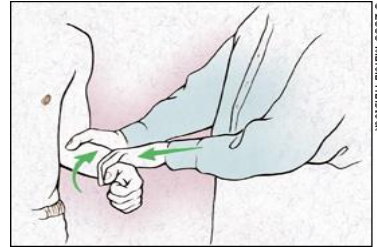
- **DROP-ARM TEST:** Tests for Rotator cuff tear

- 1) A possible rotator cuff tear can be evaluated with the drop-arm test. This test is performed by
- 2) Passively abducting the patient's shoulder,
- 3) Observing as the patient slowly lowers the arm to the waist. Often, the arm will drop to the side if the patient has a rotator cuff tear or supraspinatus dysfunction.
- 4) The patient may be able to lower the arm slowly to 90 degrees (because this is a function mostly of the deltoid)

muscle) but will be unable to continue the maneuver as far as the waist.

▪ **YERGASON TEST:** Tests for Biceps tendinitis

- 1) The patient's elbow is flexed to 90 degrees with the thumb up.
- 2) The examiner grasps the wrist
- 3) Resisting attempts by the patient to actively supinate the arm and flex the elbow
- 4) Pain with this maneuver indicates biceps tendonitis.



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▪ **SULCUS SIGN:** Tests for glenohumeral instability

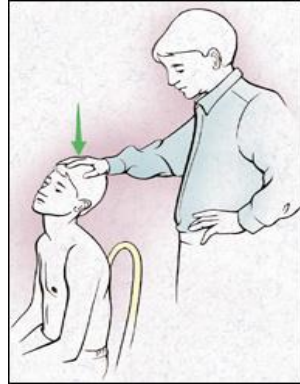
- 1) With the patient's arm in a neutral position
- 2) Examiner pulls downward on the elbow or wrist while observing the shoulder area for a sulcus or depression lateral or inferior to the acromion.
- 3) The presence of a depression indicates inferior translation of the humerus and suggests inferior glenohumeral instability.



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- **SPURLING'S TEST:** Tests for cervical root disorder in patient with neck pain

- 1) The patient's cervical spine is placed in extension
- 2) The head rotated toward the affected shoulder.
- 3) An axial load is then placed on the spine
- 4) Reproduction of the patient's shoulder or arm pain indicates possible cervical nerve root compression and warrants further evaluation of the bony and soft tissue structures of the cervical spine.



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## Summary of Maneuvers – Shoulder exam

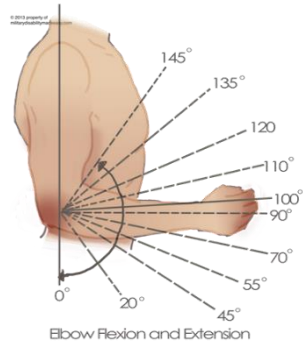
Test	Maneuver	Diagnostic Suggested by Positive Result
<b>Apley Scratch test</b>	Patient touches superior and inferior aspects of opposite scapula	Loss of range of motion: rotator cuff problem
<b>Neer’s sign</b>	Arm in full flexion	Subacromial impingement
<b>Hawkin’s test</b>	Forward elevation to 90 degrees and internal rotation	Supraspinatus tendon impingement
<b>Cross-arm test</b>	Forward elevation to 90 degrees and active adduction	Acromioclavicular joint arthritis
<b>Drop-arm test</b>	Arm lowered slowly to waist	Rotator cuff tear
<b>Spurling’s test</b>	Spine extended with head rotated to affected shoulder while axially	Cervical nerve root disorder
<b>Apprehension test</b>	Anterior pressure on the humerus with external rotation	Anterior glenohumeral instability
<b>Relocation test</b>	Posterior force on humerus while externally rotating the arm	Anterior glenohumeral instability
<b>Sulcus sign</b>	Pulling downward on elbow or wrist	Inferior glenohumeral instability
<b>Yergason test</b>	Elbow flexed to 90 degrees with forearm pronated	Biceps tendon instability or tendonitis
<b>Speed’s maneuver</b>	Elbow flexed 20 to 30 degrees and forearm supinated	Biceps tendon instability or tendonitis
<b>“Crunk” sign</b>	Rotation of loaded shoulder from extension to forward flexion	Labral disorder

# Elbow, Wrist and Hand

## Range Of Motion

Normal elbow range of motion

- Extension: 180 degrees
- Flexion: 150 degrees
- Pronation: 160-180 degrees
- Supination: 90 degrees



## Special Tests

### Elbow Pain and Symptom Syndromes

#### 1. Lateral Epicondylitis (tennis elbow):

Examination is usually remarkable

for:

- Pain on palpation around the lateral epicondyle.
- Reproducibility of pain with resisted wrist extension and supination.
- Absence of warmth, erythema, or other findings of acute inflammation.

#### 2. Medial Epicondylitis (golfer's elbow)

Examination is usually remarkable

for:

- Pain on palpation around the medial epicondyle.
- Reproducibility of pain with resisted wrist flexion.
- Absence of warmth, erythema, or other findings of acute inflammation.



### 3. Olecranon Bursitis:

Normally, the bursa is not apparent on examination. There are several situations when it becomes clinically prominent:



Minimally Inflammatory Olecranon Bursitis

### 4. Ulnar Nerve Entrapment

Examination in the setting of ulnar entrapment:

- Normal external appearance
- Usually normal motor strength: wrist flexion, finger flexion (grip), finger adduction/abduction. May be compromised if nerve compression is severe and of long duration.
- Usually normal sensation in the pinky and medial half of the ring finger (assess by checking 2 point discrimination).
- Pain reproducible with tapping over nerve, referred to as ulnar Tinnel's sign.



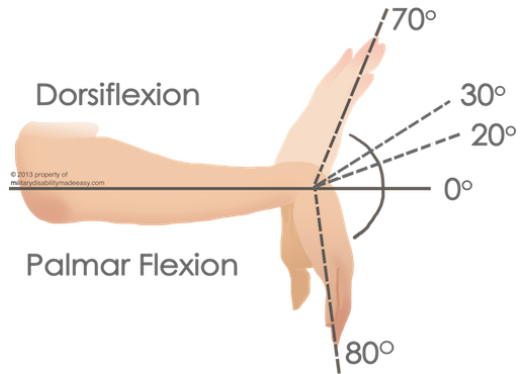
Ulnar Tinnel Test

# Hand and Wrist

Wrist Range OF Motion

Flexion

Extension



## 1. Carpal Tunnel Syndrome

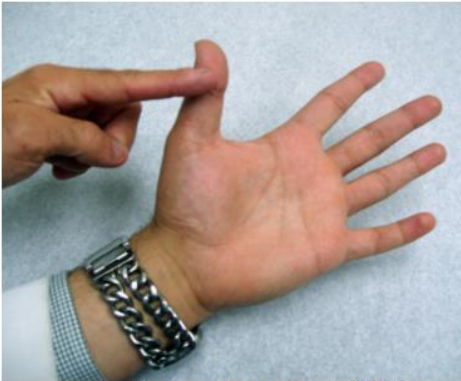
Examination:



**Tinel's Test**



**Phalen's Test**



Resistance to movement of APB



**FLICK SIGN**- Not strictly a provocative test, this refers to asking the patient what they do with hand at night when they experience symptoms. If the patient demonstrates a 'shaking out' movement of flicking the wrists, then the sign is positive. Originally claimed to show 93% sensitivity and 95% specificity for CTS, subsequent investigators have found it performs less well.

## 2. Dupuytren's Contracture

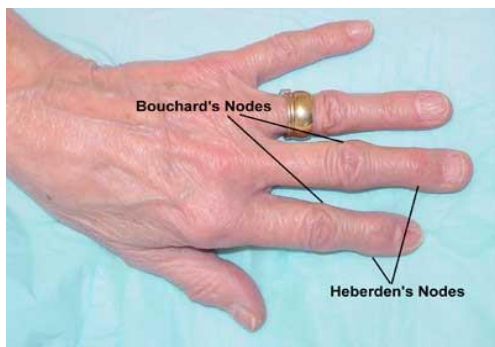
Examination:



### 3. Heberden's Nodes



Heberden's Nodes



## 4. Trigger Finger

Examination:

- The palm and fingers usually appear normal. The affected tendon is not visible.
- Ask the patient to fully flex the affected finger. When they attempt to extend and flex it, the movement will be impaired. It's worth noting that sometimes the triggering does not occur with every movement.
- If you place one of your fingers over the affected tendon, you may feel the "pop" when it finally pulls thru. There is usually no associated pain or inflammation.

## 5. Tenosynovitis of the Thumb (DeQuervain's type)

Examination:

- Direct the patient to place the thumb in their palm.
- Have them cover the thumb with the fingers of the same hand, forming a fist.
- Gently deviate the wrist towards the ulna. This stretches the inflamed tendons over the radial styloid, reproducing the patient's pain.

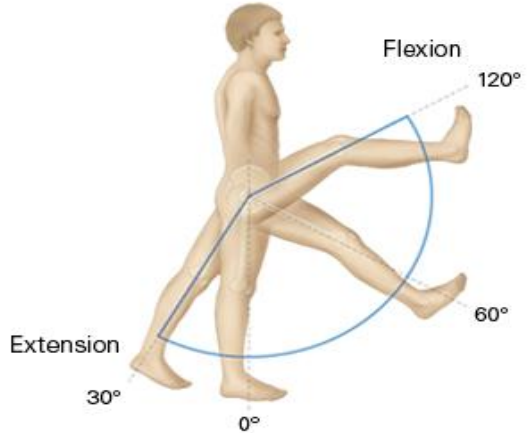


Finkelstein's Test

# Hip Exam

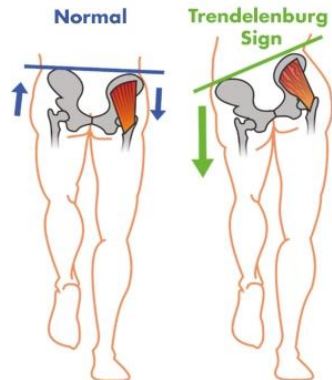
Range of Motion (ROM) Hip ROM should be tested looking for pain or limitation.

- Check the following motions:
- Internal rotation ( $30^\circ$ ) — stabilize knee at  $90^\circ$  flexion with patient seated and move foot away from midline.
- External rotation ( $60^\circ$ ) — in the same position, move foot toward midline (lost early with hip)
- Flexion ( $120^\circ$ ) — with patient supine, grasp bent knee and pull to chest (stop when back flattens)
- Extension ( $15^\circ$ ) — while prone, lift leg off table
- Abduction ( $45^\circ$ ) — with patient supine, hold ankle and pull leg away from midline
- Adduction ( $30^\circ$ ) — with patient supine, pull leg toward midline (until pelvis tilts)



## Inspection

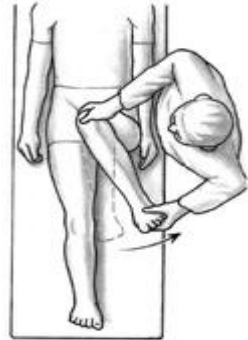
- Gait
  - Observe the stride length, foot rotation, pelvic rotation, stance phase
  - Antalgic (painful)
    - shortened stance phase on affected side
  - Trendelenberg
    - secondary to abductor weakness
    - weight bearing on the affected hip leads to a contralateral hip drop



## Special Tests

### FADIR test

- hip **F**lexed to 90 deg, **A**dducted and **I**nternally **R**otated
- positive test if patient has hip or groin pain
- can suggest possible labral tear or FAI



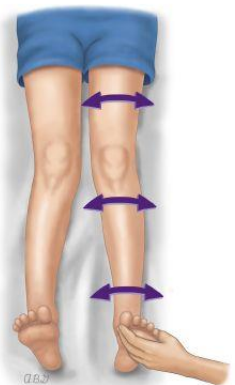
### FABER test (aka Patrick's test)

- hip **F**lexed to 90 deg, **A**Bducted and **E**xternally **R**otated
- positive test if patient has hip or back pain or ROM is limited
- can suggest intra-articular hip lesions, iliopsoas pain, or sacroiliac disease (posteriorly located pain)



### Log roll test

- passive maximal internal and external rotation of lower extremity while supine
- clicking or popping suggest acetabular labral tear
- increased total ROM compared to contralateral side suggests ligament or capsular laxity



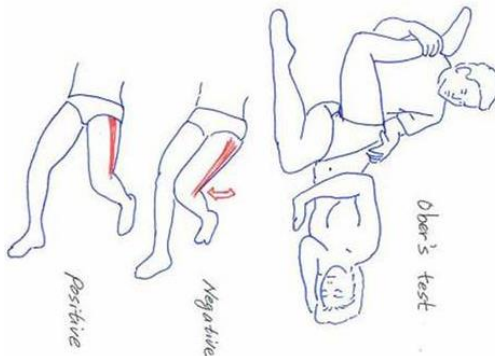
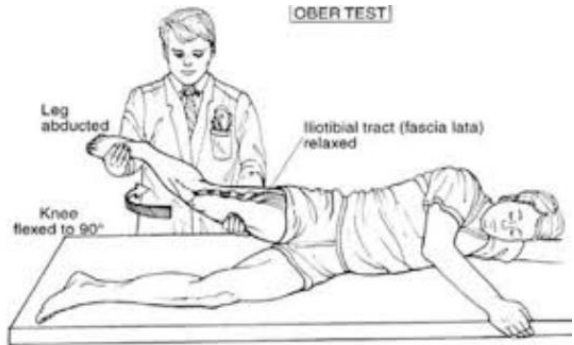
## Thomas test

- with patient supine, fully flex one hip.
- if contralateral hip lifts off table, there is likely a fixed flexion deformity



## Ober's test

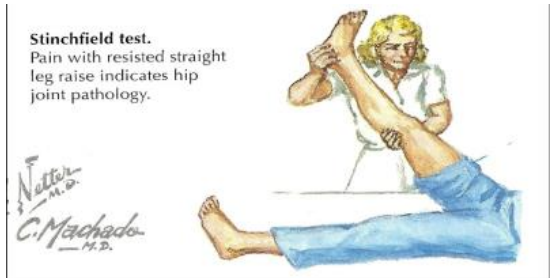
- patient placed in lateral position with affected side up
- with hip in slight extension, abduct the leg then allow it to drop into adduction
- if unable to abduct leg, suspect tight ITB





## Stinchfield resisted hip flexion test

- with patient supine and extended knee, examiner resists active hip flexion past 30-45 deg
- a positive test elicits pain which is likely to be associated with an intraarticular hip pathology



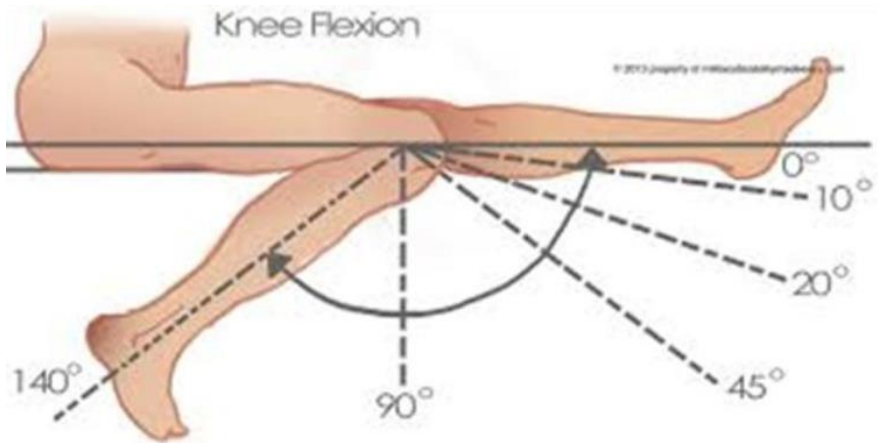
# The Knee Exam

## Range of Motion (ROM)

If the knee is injured, start by examining the unaffected side. This allows for comparison and relaxes the patient as you are not performing maneuvers that cause discomfort from the outset.

1. *Active (patient moves the joint) then passive (you move the joint)*
2. *Hand on patella with extension and flexion. Osteoarthritis, may feel grinding sensation (crepitus)*

## Normal range of movement



Full Flexion: 140

Full

Extension: 0

## Palpation / Feel

- **Temperature change**
- **Tenderness:**
  - *joint line tenderness* - done by flexing the knee and palpating the joint line with the thumb.

- Tenderness of tibial tubercle / patellar tendon / quadriceps tendon.
- **Effusion**
- **Patellofemoral crepitus**
- **Thickened synovial membrane**- spongy/boggy feel, edge can be rolled <sup>[L]</sup><sub>[SEP]</sub>
- Quadriceps and hamstrings power

## Effusion

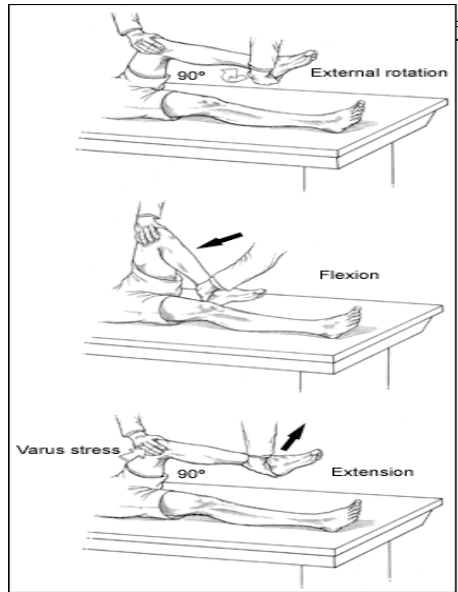


## Patellar Instability

- Measure **Q angle**, angle between a line from ASIS to center of patella and center of patella to tibial tuberosity; compare. Men: 8-10°, women: 15±5°
- **Dynamic patellar tracking** in sitting- (positive **J sign** –lateral subluxation of patella in full extension).
- **Active patellar tracking** with knee extended-normal patella moves more superiorly than laterally.
- If more lateral movements –abnormal
- **Apprehension Test:** Knee in 20-30 degree flexion; Manually subluxate patella laterally - Pain & resistance for lateral motion- positive test

# Test for Meniscal Injury

- **Joint line tenderness:** medial joint line tenderness-medial meniscus tear; lateral joint line tenderness-lateral meniscus tear.
- **McMurray test:** McMurray test to assess the medial meniscus. The test is performed with the patient supine and the knee flexed to 90 degrees. To test the medial meniscus, the examiner grasps the patient's heel with one hand to hold the tibia in external rotation, with the thumb at the lateral joint line, the fingers at the medial joint line. The examiner flexes the patient's knee maximally to impinge the posterior horn of the meniscus against the medial femoral condyle. A varus stress is applied as the examiner extends the knee.



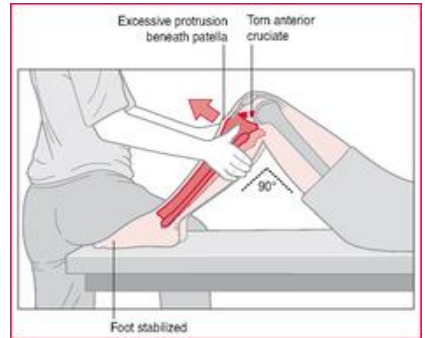
- **Apley Grinding test:** prone; knee 90 degree; ant. thigh flexed against table foot and leg pulled upwards/downwards and rotated+ joint slowly flexed and extended/ popping-tear
- The test is performed at 5° and 20° of flexion. The examiner supports the patient by holding his or her outstretched hands while the patient stands flatfooted on the floor. The patient then rotates his or her knee and body, internally and externally, three times, keeping the knee in slight flexion (5°). The same procedure is then carried out with the knee flexed at 20°. The test is always performed first on the normal knee so that the



patient may be trained, especially with regard to how to keep the knee in 5° and then in 20° of flexion.

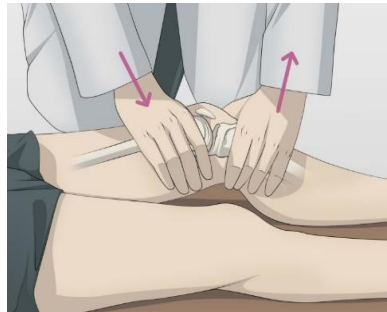
## Anterior Cruciate Ligament (ACL): 1. Anterior drawer test

- Supine
  - Hip-45 degree
  - Knee 90 degree
  - Stabilize foot
- Ensure tibia is not sagging behind- otherwise false positive result
  - Not possible in acute painful knee



## Anterior Cruciate Ligament (ACL) 2. Lachman Test

- Supine
  - Knee 15-degree flexion
  - Slight ext. Rotation
  - **Most sensitive** test for ACL rupture
  - Useful in painful knee/ door step effect of menisci
1. Grasp femur with left hand, tibia w/right.
  2. Flex knee slightly.
  3. Pull up sharply (towards belly button) with right hand, stabilizing femur with left.
  4. Intact ACL limits amount of distraction, described as “firm end point” with Lachmans
  5. If ACL torn, tibia feels unrestrained in forward movement.



## Drop Lachman's Test For Patient's With Big Legs &/or Examiners With Small Hands

1. Patient hangs leg off table
2. Place ankle between legs to stabilize & hold knee in ~30 degrees flexion
3. Place hand on femur, holding it on table
4. Grasp tibia with other hand & pull forward



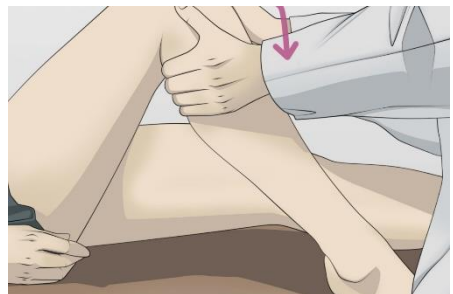
## Anterior Cruciate Ligament (ACL) 3: Pivot Shift Test

- Patient supine, relaxed
- Hip at 30° abduction, knee in IR and valgus strain (subluxate the knee); do gradual flexion from extension.
- See for the reduction of the lateral femoral condyle.
- **Most specific** for ACL tear



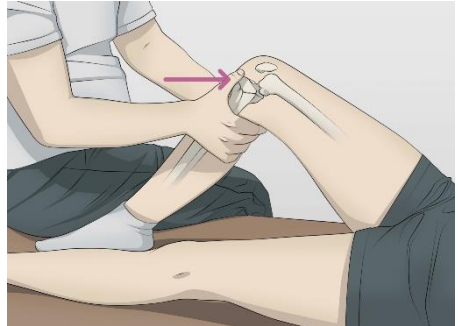
## Posterior Cruciate Ligament (PCL) 1: Sag sign

- Knee 90°
- Support heel
- Tibia sags visibly posteriorly from effect of gravity
- Compare silhouette both sides
- **Godfrey test:** sag sign at 90° flexion at hip & knee



## Posterior Cruciate Ligament (PCL): 2. Posterior drawer test

- Supine
  - Knee 90 degree
  - Excessive posterior laxity / no hard end point felt s/o PCL tear
1. Patient lies down, knee flexed ~ 90 degrees.
  2. Sit on foot. Grasp below knee w/both hands, thumbs meeting at front of tibia.
  3. Push backward, noting movement of tibia relative to femur. Intact PCL has a discrete end point.
  4. If PCL torn, tibia feels unrestrained in
  5. Torn PCL
  6. Movement backwards



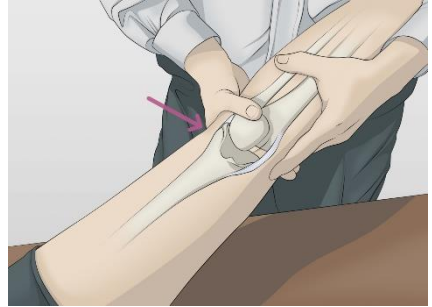
## Posterior Cruciate Ligament (PCL) 3: Quadriceps Active Test

- Supine
- Knee 90 degree
- Active gentle quadriceps contraction to shift tibia without extending knee
- Anterior shift of tibia is seen in PCL tear



## Medial Collateral Ligament (MCL): Valgus stress test

- Supine
- Side Of Table
- Abducted Of The Side Of Table
- Knee Flexion 30
- Valgus Strain
- External Rotation
- Observe Stability



## Lateral Collateral Ligament (LCL): Varus stress test

- Varus Strain Given Similarly at 30 degree flexion
  - Observe Instability
  - Palpate LCL
  - LCL Torn-not Palpable
  - Compare
1. Flex knee ~ 30 degrees.
  2. Right hand medial aspect knee.
  3. Left hand on ankle or calf.
  4. Push steadily w/right hand while supplying opposite force w/ left.
  5. If LCL torn, joint will "open up" on lateral aspect.
  6. May elicit pain on direct palpation of injured ligament





## Summary of Maneuvers – Knee Exam

Name of Maneuver	Clinical Interpretation
<input type="checkbox"/> <b>Observe knee, identify surface anatomy, palpation</b>	Variety of pathologic processes
<input type="checkbox"/> <b>Range of motion, with palpation</b>	Abnormal w/variety pathologic processes, crepitus with DJD
<input type="checkbox"/> <b>Ballotment (pushing down on patella)</b>	Patella “springs” upward, suggests large effusion
<input type="checkbox"/> <b>Joint line tenderness</b>	Meniscal injury, djd
<input type="checkbox"/> <b>McMurray’s Test (foot everted, knee varus position, flex/extend while palpate medial joint line; then invert foot, knee valgus, palpate lateral joint line while flex/extend)</b>	Pain or palpable click with hand on joint line suggests Meniscal injury
<input type="checkbox"/> <b>Appley Grind Test (patient supine, knee flexed 90 degrees, examiner rotates foot while providing downward pressure)</b>	Pain suggests meniscal injury along side being palpated
<input type="checkbox"/> <b>Medial and Lateral joint line stress</b>	Excessive laxity suggests MCL or LCL tear
<input type="checkbox"/> <b>Lachman’s Test (stabilize femur with one hand, pull anteriorly on tibia with other) or - if small hands &amp;/or large leg</b> <input type="checkbox"/> <b>Drop Lachman’s Test (leg positioned over side of table, stabilize ankle between examiner’s legs, hold femur down w/one hand, pull upward on tibia w/other)</b>	Excessive laxity suggests ACL tear
<input type="checkbox"/> <b>Posterior Drawer Test (knee 90 degrees, examiner sits on patient’s foot and pushes posteriorly on tibia)</b>	Excessive laxity suggests PCL tear
<input type="checkbox"/> <b>Assorted patellar manipulation (push down on patella, palpate undersurface)</b>	Pain suggests Chondromalacia Patellae

## Knee Injury: Diagnostic Accuracy of Physical Examination Maneuvers and Clinical Findings

MANEUVER OR CLINICAL FINDINGS	POSITIVE LIKELIHOOD RATIO*	NEGATIVE LIKELIHOOD RATIO*	PROBABILITY OF INJURY IF MANEUVER IS†	
			POSITIVE (%)	NEGATIVE (%)
<b>Anterior cruciate ligament tear</b>				
Pivot shift test <sup>3</sup>	20.3	0.4	69	4
Lachman test <sup>3</sup>	12.4	0.14	58	2
Anterior drawer test <sup>3</sup>	3.7	0.6	29	6
<b>Effusion</b>				
Ballottement test; noticeable swelling <sup>16</sup>	3.6	0.4	NA	NA
<b>Meniscal tear</b>				
Thessaly test <sup>15</sup>	39.3	0.09	81	1
McMurray test <sup>3</sup>	17.3	0.5	66	5
Age > 40 years, continuation of activity not possible, weight bearing during trauma, and pain with passive flexion <sup>17</sup>	5.8	0.9	39	9
Joint line tenderness <sup>3</sup>	1.1	0.8	11	8