*2023 Napa Primary Care Conference*

# Evaluation of the Painful Knee

**Robert Sallis, MD, FAAFP, FACSM**

Director; Sports Medicine Fellowship

Kaiser Permanente Medical Center

Fontana, California

Clinical Professor of Family Medicine

Kaiser Permanente Bernard J Tyson

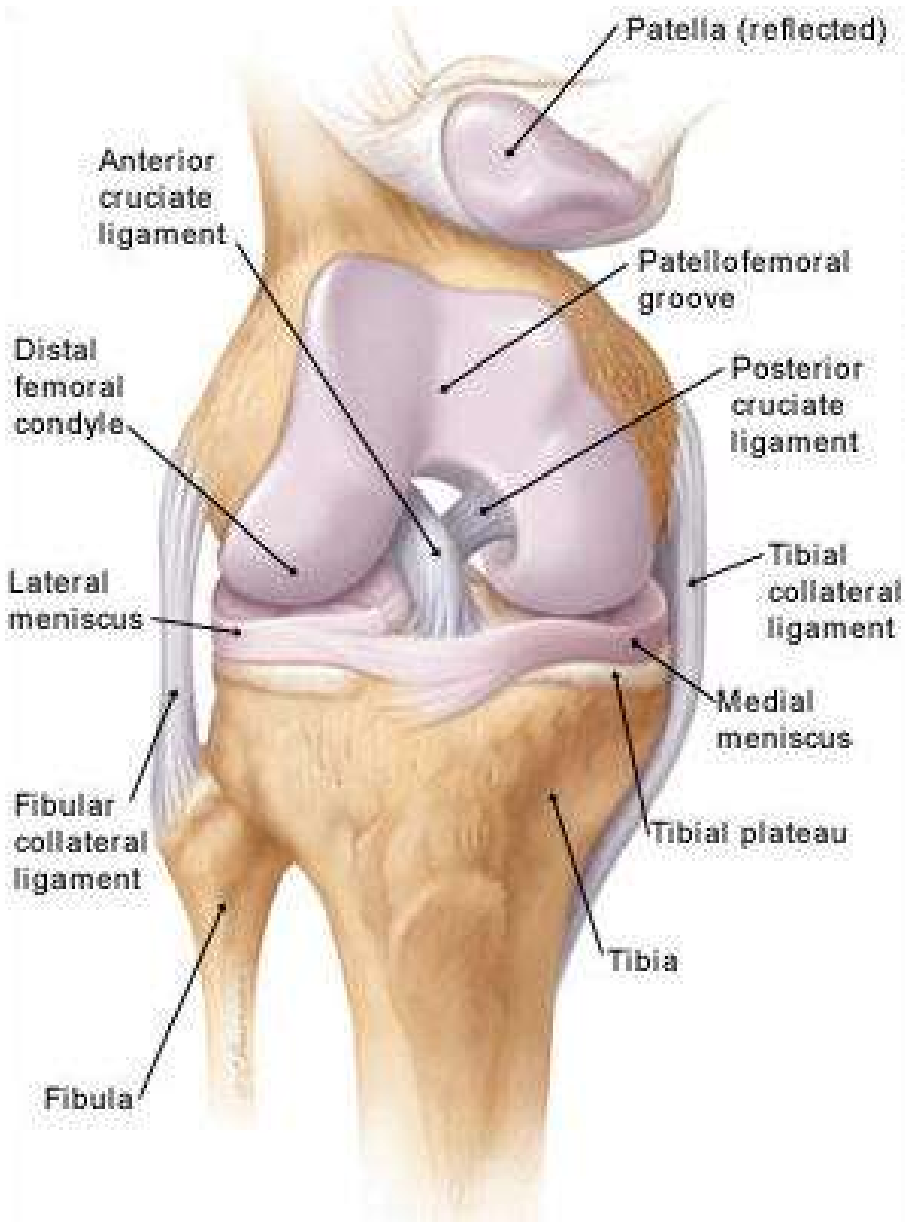
School of Medicine

# Introduction

- Knee problems are extremely common in primary care.
- Injury can result from acute trauma or chronic overuse.
- They often present diagnostic challenge requiring a skilled history and physical exam for proper assessment.

# The Knee

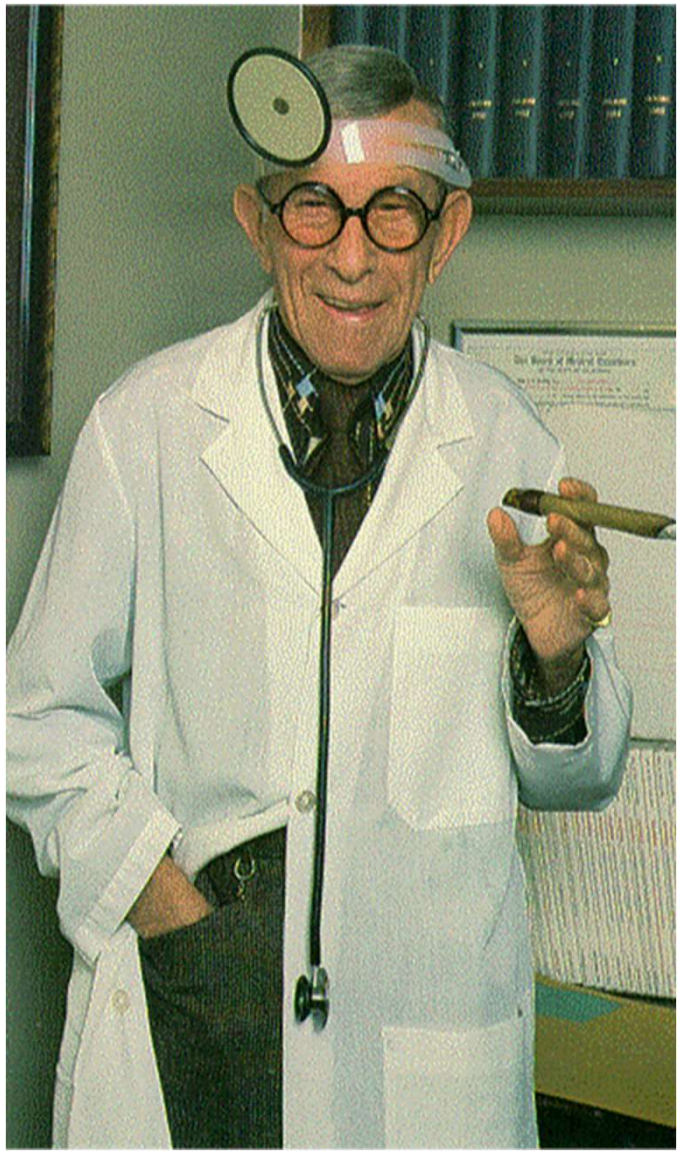
- Largest joint in the body.
- Hinged joint with 2 articular surfaces:
  - Tibiofemoral joint.
  - Patellofemoral joint.
- 4 Ligaments stabilize.
  - ACL and PCL.
  - MCL and LCL.
- 2 menisci absorb shock and transmit loads.



# Common Causes of Knee Pain by Age

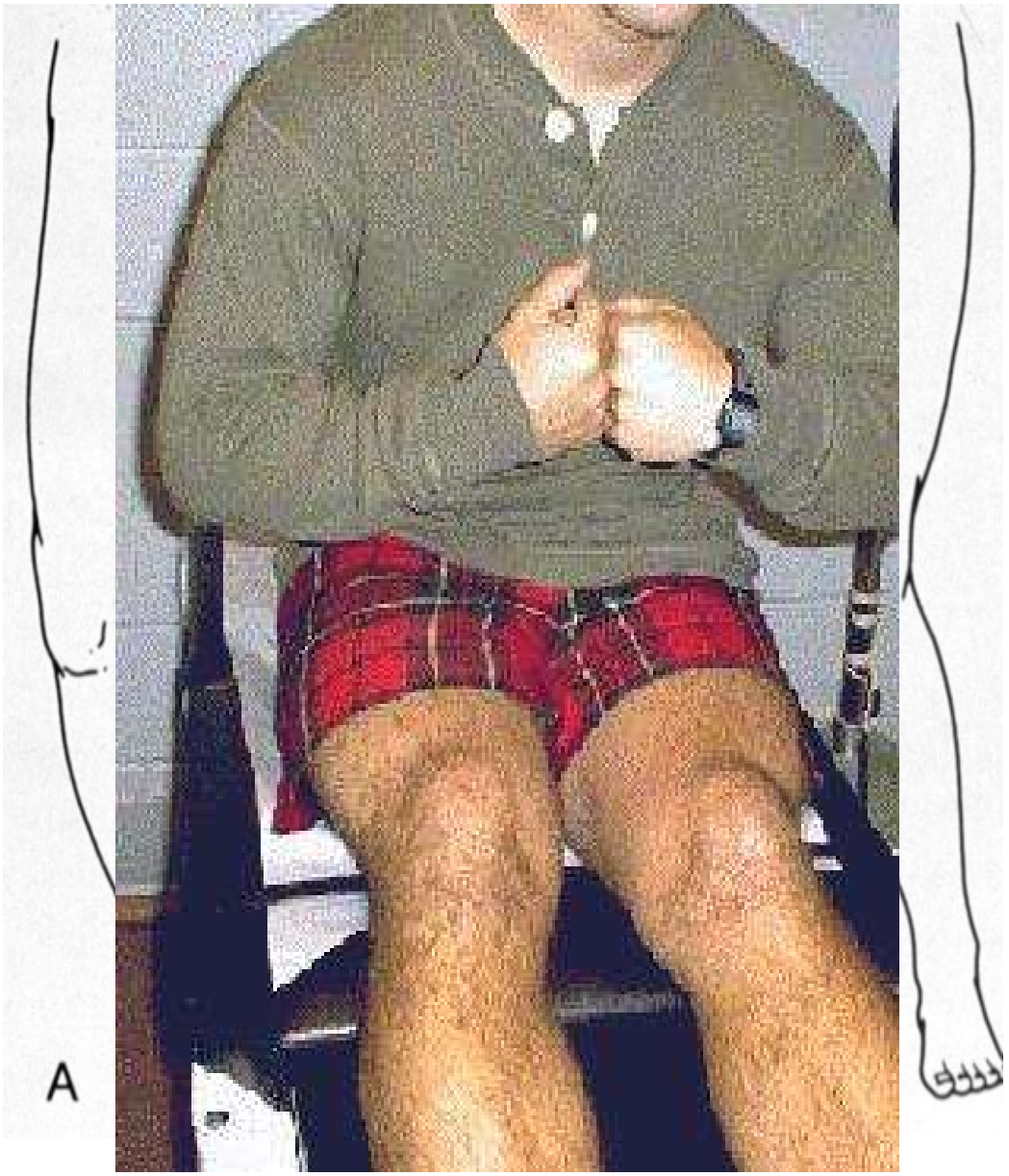
- Children and Adolescents:
  - Osgood Schlatter's; Sinding-Larsen (apophysitis).
  - Patella subluxation; Patellofemoral dysfunction.
  - Referred pain (Hip; SCFE/Perthes); OCD.
- Adults:
  - PFD, Patella tendonitis, Bursitis.
  - Ligament sprains and tears (MCL, ACL); acute meniscal tears.
- Older Adults:
  - OA; Crystal arthropathy (gout, pseudo).
  - Degenerative meniscal tears, Baker's cyst.

# History Questions



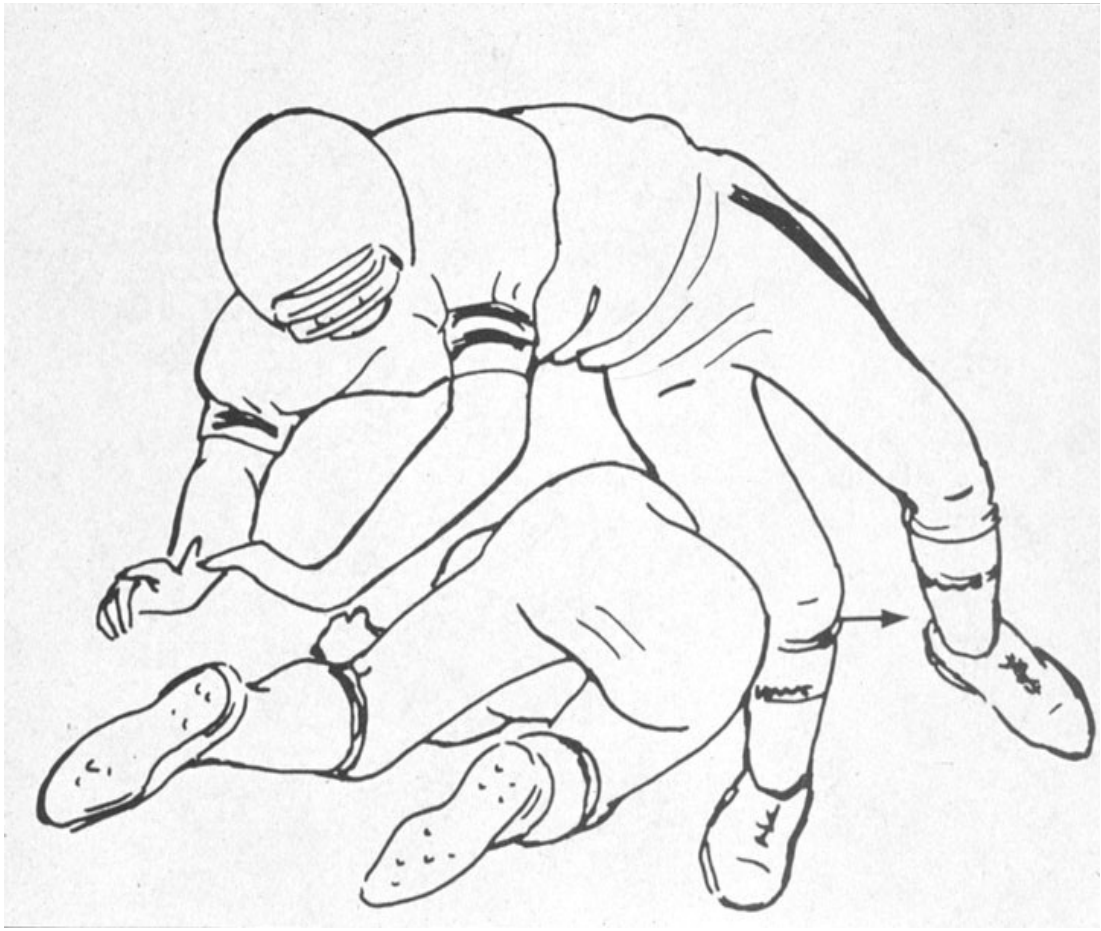
# What Was the Mechanism of Injury?

- Picture forces applied to knee.
- Most common causing injury are valgus, varus, AP, PA, twist, or hyperextension.
- *"Two fist sign"* – patient describes injury by twisting opposing fists. Suggests ACL injury.



# Mechanism of Injury - MCL

- Planted knee hit from lateral side creating a valgus stress.

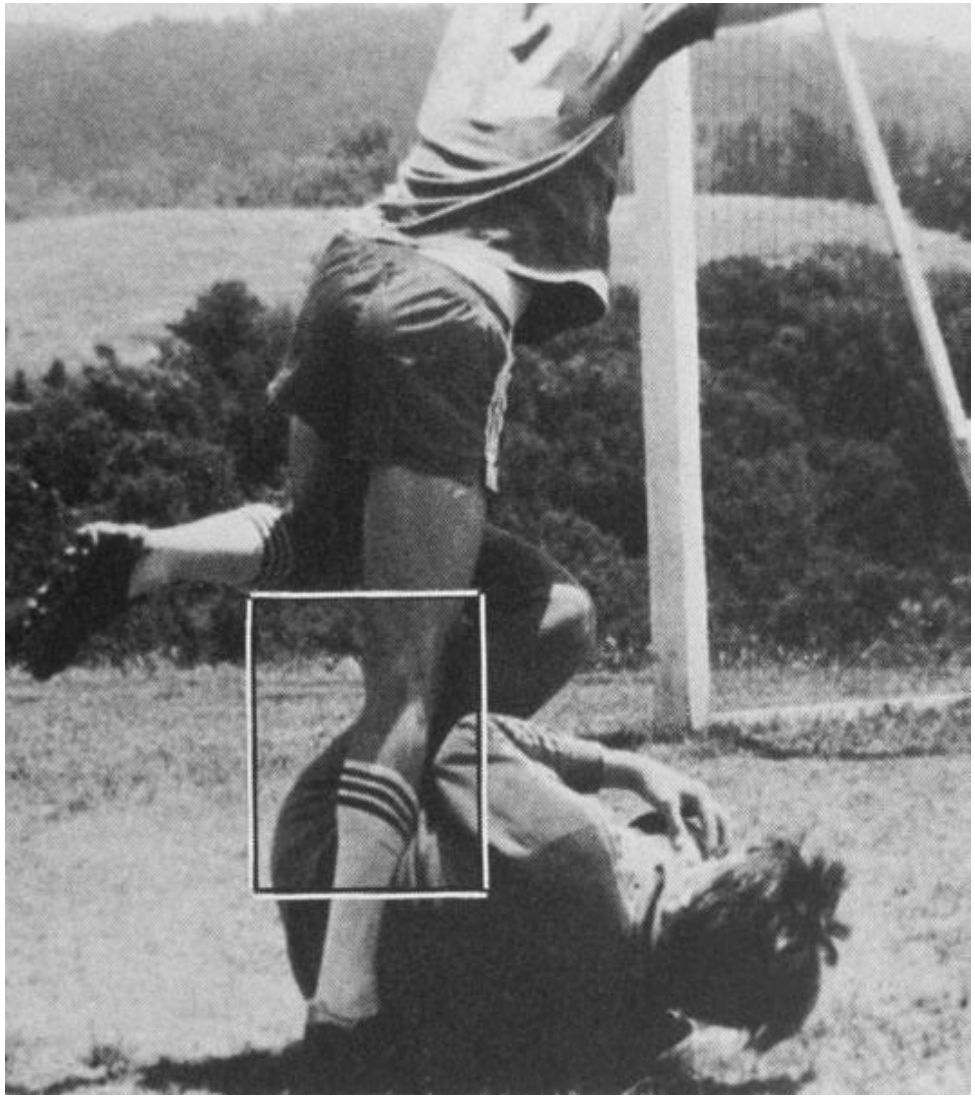


# Mechanism of Injury - ACL

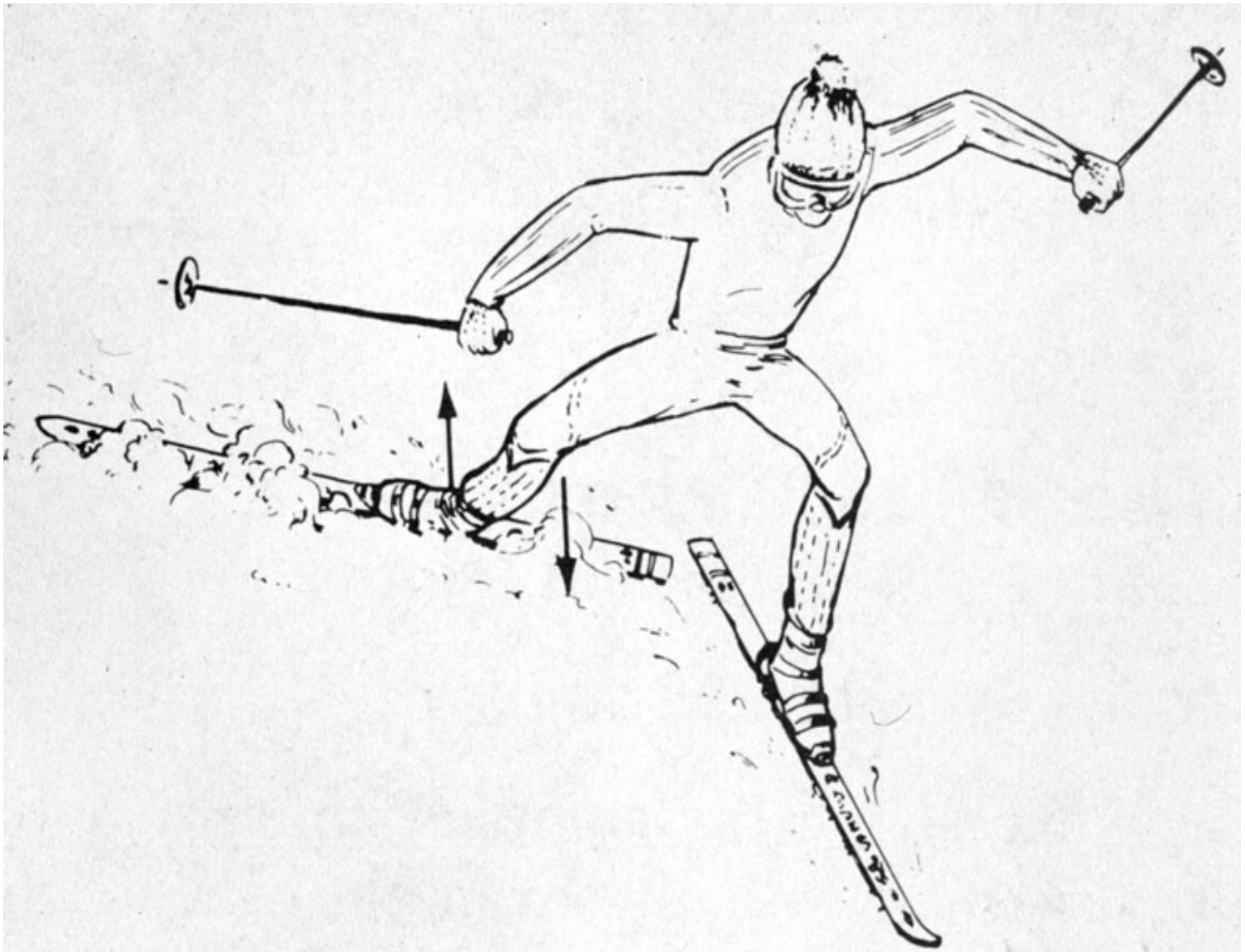
Anterior Force

Twisting Force

# Mechanism of Injury - PCL



# Mechanism of Injury – “Unhappy Triad” (External rotation and valgus)



# Severe Hyperextension Injury

# Severe Valgus Trauma

# 132 Patiets With Acute Knee Injury and Hemearthrosis: All Had Arthroscopy

- 101 (77%) had ACL tears.
- 17 (13%) had meniscal tears.
- 11 (8%) had osteochondral fractures.
- Only 2 knees (1.5%) showed no abnormality.

Hardaker, Southern Med J; 1990

# Where Is the Pain Located?

- Medial – MCL, meniscus, Pes anserine.
- Lateral – meniscus, IT band, LCL, Poster lateral corner.
- Front – patella, ACL (deep), patellar tendon, quad tendon.
- Back – hamstring tendon, PCL, baker's cyst.

# Were They Able to Continue Activity?

- Unlikely to continue if serious ligament or cartilage injury.
- ACL may try, but invariably stop because knee feels unstable.
- MCL feels fine going straight ahead, but hurts to run laterally.

# How Long Until Swelling Occurred?

- 0-12 hours – suspect ACL tear, patellar dislocation.
- 12-24 hours – suspect meniscus tear.
- Recurring – suspect chronic or degenerative meniscus tear, or OA.
- Rapid swelling (within 24 hrs) almost always blood.

# What Treatments Were Used?

- If RICE was used and knee still swollen and sore, then significant injury is more likely.
- If ROM and PT exercises have been done and knee still stiff or atrophied, then significant injury is more likely.

# Any Mechanical Symptoms Occurring Since the Injury?

- These include locking, give-way,or swelling.
- Locking is inability to extend knee.
- These symptoms suggest meniscus tear.

# Any History of Prior Knee Problems?

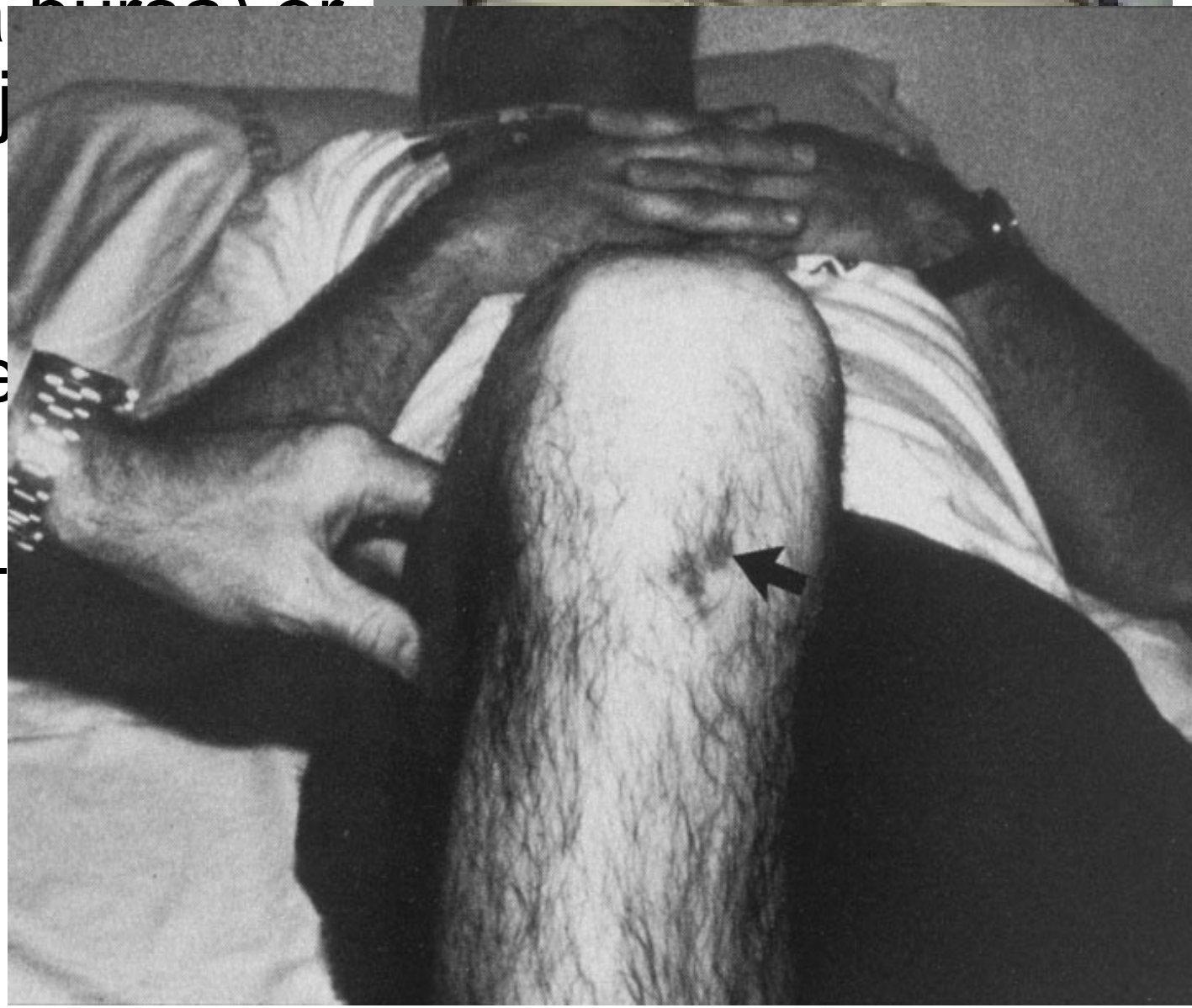
- Patella dislocation is at risk to recur.
- Healed or repaired meniscus tear is at risk for re-injury.
- Natural history of ACL-deficient knee is to develop meniscus tear, followed by early OA (although recent studies do not show this).

# Physical Exam
## Should Include:

- Inspection
- Palpation
- Range-of-motion
- Ligament testing
- Meniscal tests
- Patella tests

# Inspection

- Swelling – is it in front of (pre-patella bursa) or behind (knee j kneecap?
- Quad atrophy significant inte derangement.
- *Ecchymosis* – bleeding from tear.

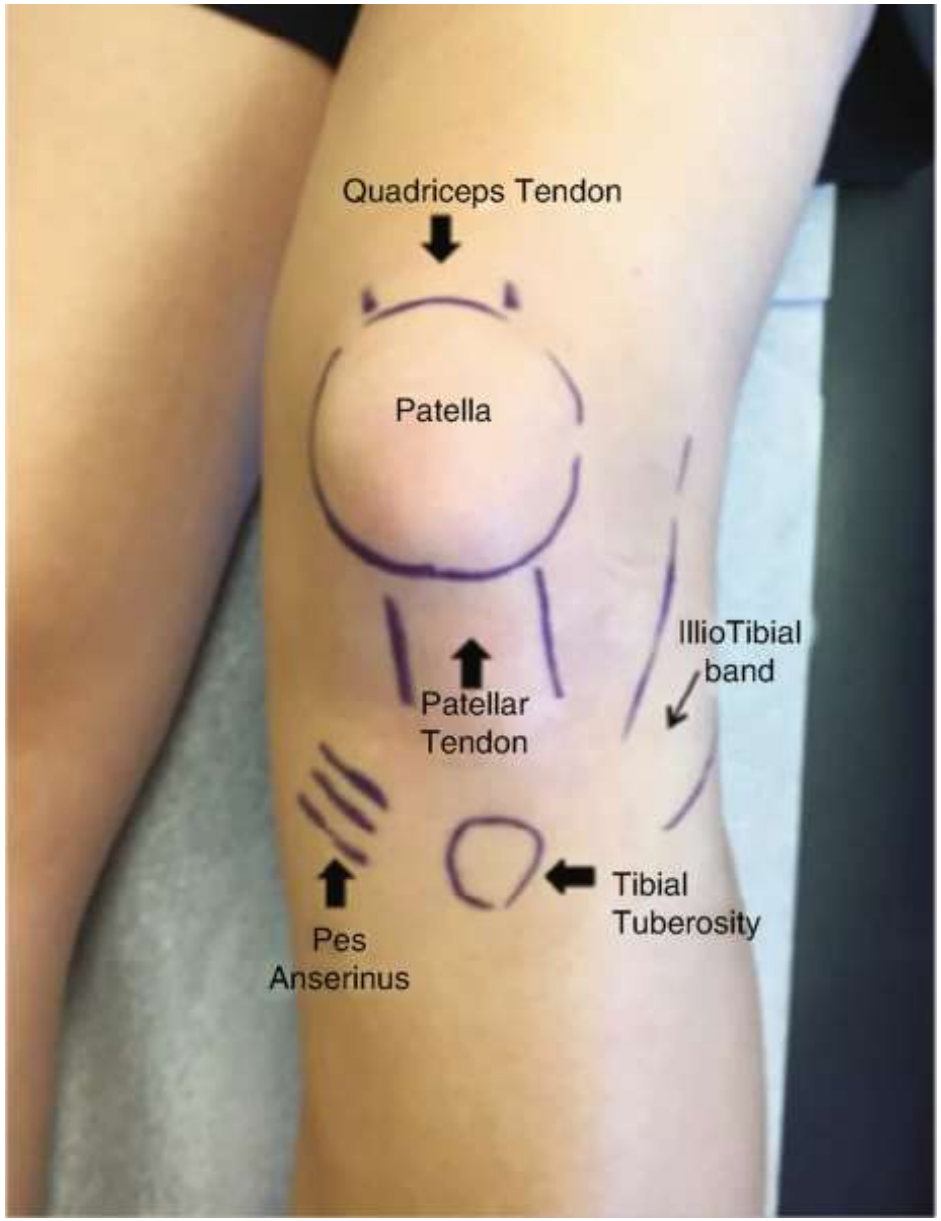


# Effusion (Swelling in Knee Joint) Graded 0 – 3+

- 0 (no effusion) – normal.
- 1+ (trace) – think OA, old meniscus tear.
- 2+ (moderate) – think meniscus tear, PCL tear.
- 3+ (large) – think ACL tear, patella dislocation.

# Tenderness to Palpation

- Tibial tubercle – Osgood Schlatter's.
- Patella tendon – tendonitis.
- Patella (around and under) – PFD, bursitis, chondral injury, Sinding-Larsen disease).
- Joint line (medial/lateral and AP) – meniscal tear.
- Medial side – MCL, Pes anserine.
- Lateral side – IT band, LCL.



# Range of Motion

- Flexion (130 °) – limited by joint effusion or quadriceps tightness.
- Extension (0 °) – lack suggests mechanical block (meniscus tear, loose body) or hamstring tightness.
- *Prone* knee extension – measure heel height difference to document extension.
- *Extensor* mechanism (quad-patella-tibia) – check with active extension.

# Range of Motion

ROM 0-130$^{o}$

Prone Knee Extension

# Ligament Testing

- MCL – valgus stress.
- LCL – varus stress.
- ACL – Lachman test, anterior drawer, pivot shift.
- PCL – sag sign, posterior drawer.

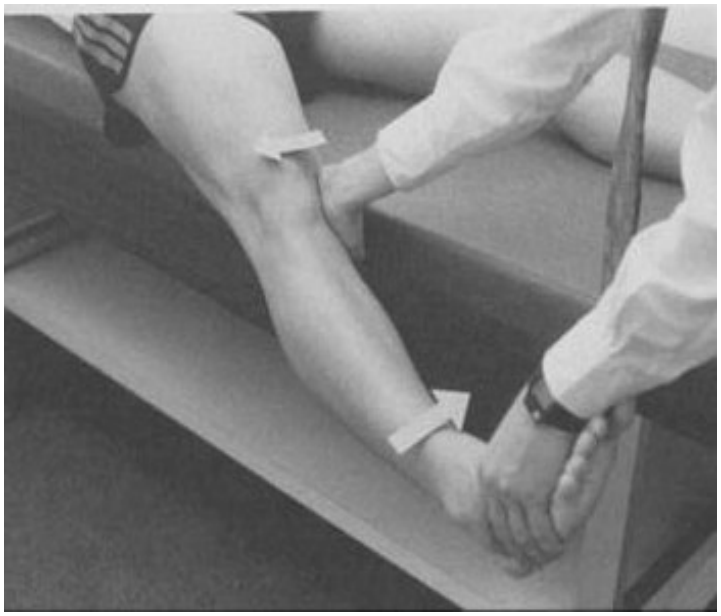
# MCL Tests: 3 Grades of Injury

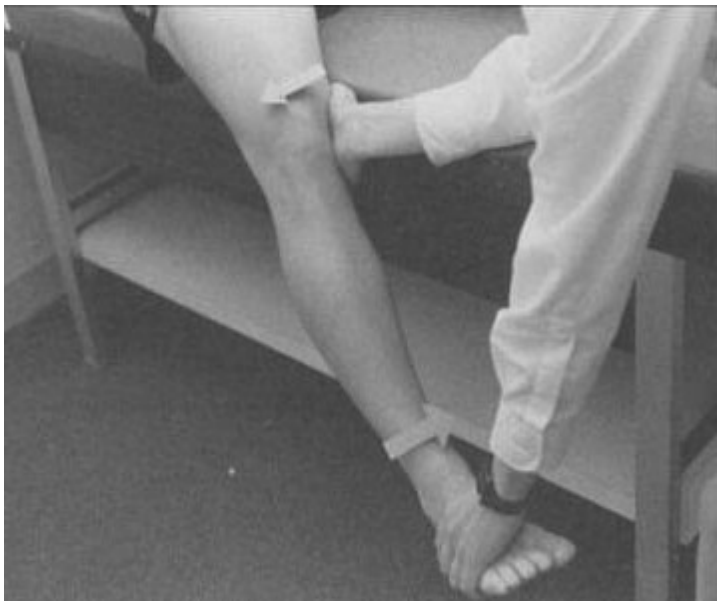
- Test with valgus stress at $0^{o}$ and $20^{o}$ flexion.
- Grade I – pain without laxity.
- Grade II – pain with slight laxity (weak end point).
- Grade III – less pain with significant laxity (no good end point).

# MCL – valgus stress

# LCL Tests

- Test with varus stress at $0^{o}$ and $20^{o}$ flexion.
- Same grading as MCL, but seen much less commonly.
- If significant laxity, suspect posterolateral corner injury, which may accompany knee dislocation.

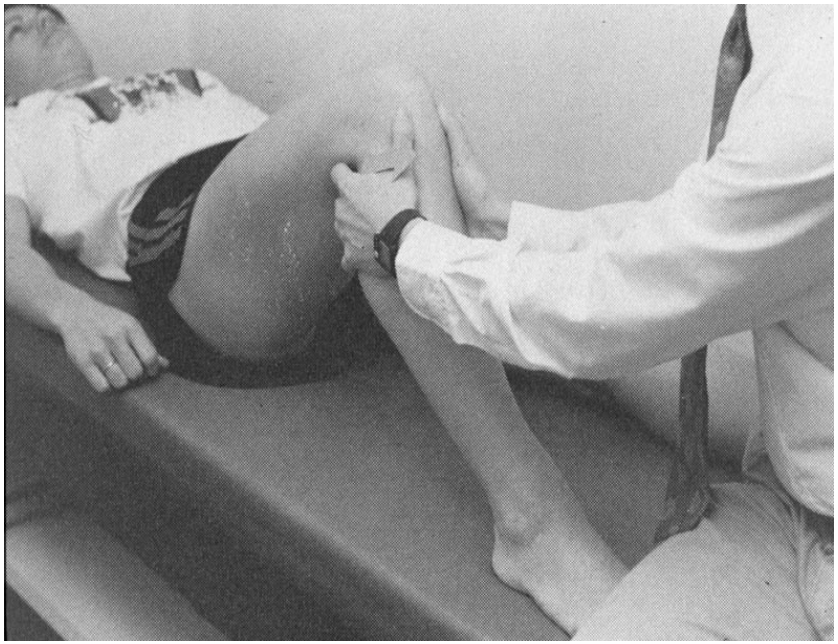




# LCL – varus stress

# ACL Tests

- Lachman test – done supine with knee in 20$^{o}$ flexion, apply AP force. Definitive test.
- Anterior drawer test – done supine with knee in 90$^{o}$ flexion, apply AP force. Limited by collateral ligaments.
- Pivot shift – helpful in assessing secondary knee restraints. Positive with very lax knee.

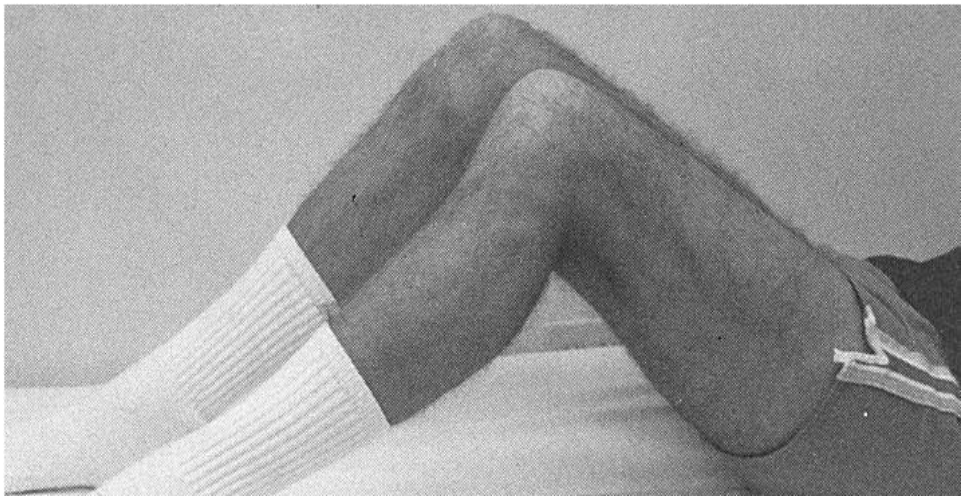


# Lachman test

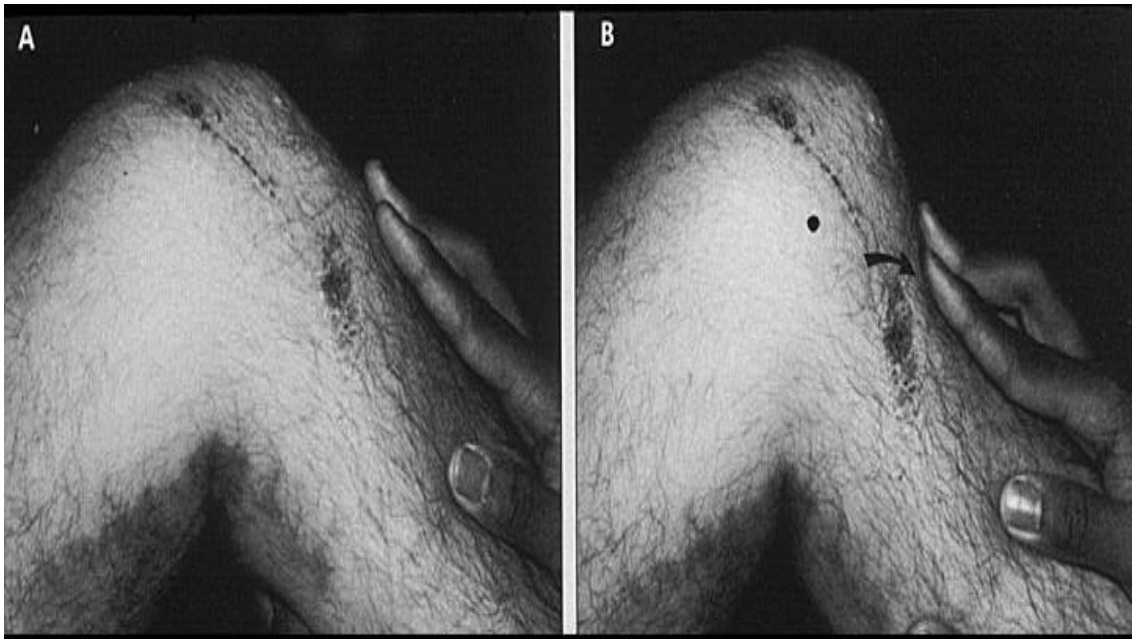
# Anterior & Posterior drawer tests

# PCL Tests

- Sag sign – done with knee bent to 90$^{o}$ and foot flat on table. Tibia sags posterior.



- Posterior drawer – done with knee in 90$^{o}$ flexion, and posterior force applied.



# Meniscal Tests

- Prone knee extension – look for difference in heel height.
- Thessaly Test – knee bent ~20 and rotate 3 times (IR and ER).
- Bounce test – bouncing knee into full extension causes pain.
- Duck walk (in full squat) – unlikely able to do this with meniscus tear.

# Thessaly Test

- Patient stands flat footed first with $5^{o}$ and then $20^{o}$ bend in knee.
- Examiner holds hands for support.
- Patient rotates (IR and ER) 3 times over each flexed knee.
- Pain or locking at joint line suggests meniscus injury

# Bounce Test and Duck Walk

# Meniscal Tests (Continued)

- McMurray's test – lie supine, then flex and extend knee with internal and external rotation, feeling for clunk.
- Apply compression test – lie prone with knee flexed to 90°, and axial load. Look for pain or click.
- Both these tests have high rate of false positives.

# Patella Tests

- Q-angle (quadriceps angle) - >15$^{o}$ in female and >10$^{o}$ in male predisposes to PFD.
- Apprehension test – pushing kneecap in lateral direction causes apprehension after dislocation.
- Patella grind test – pushing down on kneecap and grinding back and forth causes pain with PFD (frequent false +).

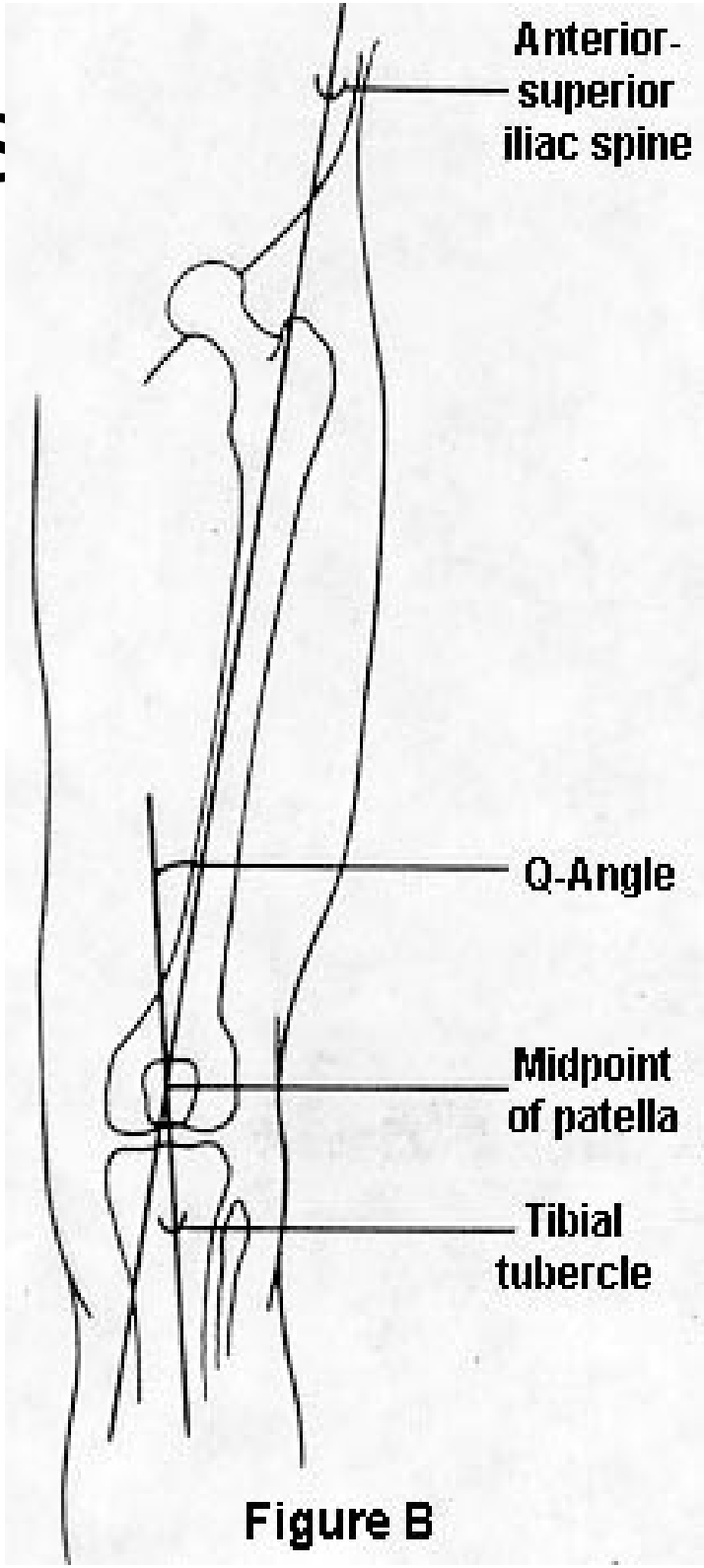
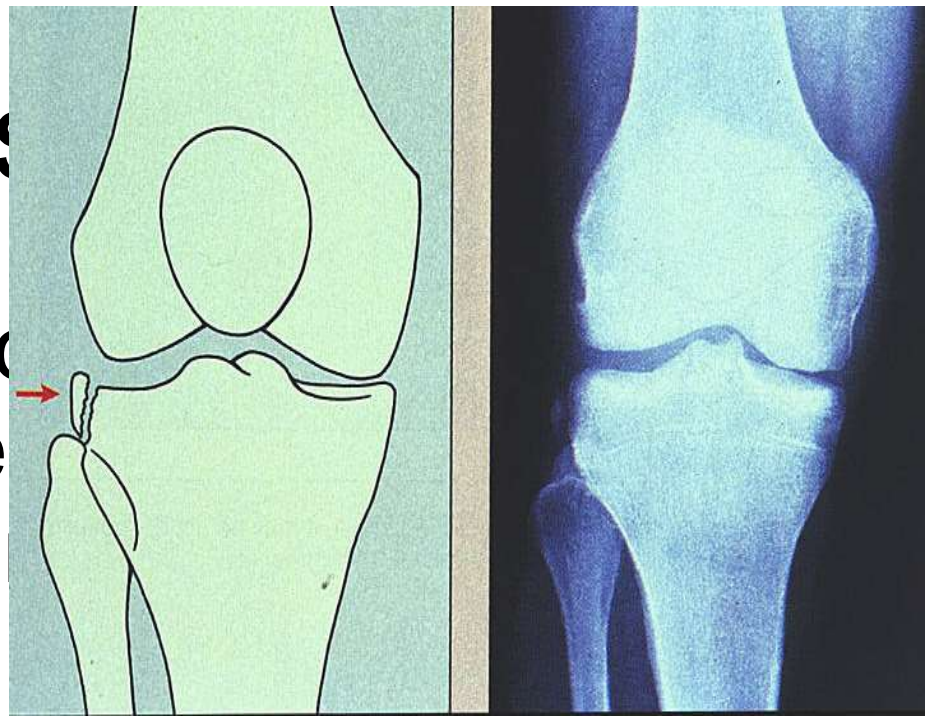


Figure B

# Patella Apprehension and Grind Tests

# X-rays



- AP / lateral views – look fo bearing), Segond fracture capsular avulsion), tibia o condyle fracture.
- Tunnel view (knee in 90° flexion) – look for tibial spine avulsion in suspected ACL or PCL tear.
- Merchant view – tangential view of kneecap, done if PFD or dislocation suspected.

# Ottawa Knee Rules
## X-ray if any of the following:

- Age $\geq$ 55 years.
- Isolated tenderness over patella.
- Tender at head of fibula.
- Inability to flex to $90^{o}$.
- Unable to take 4 steps.

# Knee Exam Summary

- A focused history should point you toward the correct diagnosis of an injured knee.
- Physical exam used to narrow differential diagnosis.
- Exam should include inspection, palpation, ROM, ligament, meniscus and patella tests.

# Questions?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