


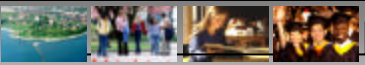

## Knee Orthopaedic Tests

James J. Lehman, DC, MBA, DABCO  
University of Bridgeport College of Chiropractic






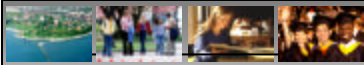

## Sports and Knee Injuries


## Knee Injury Strain, Sprain, Internal Derangement





- Please differentiate an internal derangement from an external knee injury.

## Anatomy of the Knee

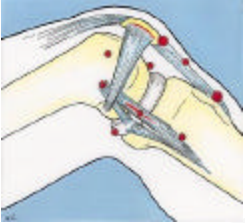


- How many types of injuries to the knee should we expect to treat with manipulation?






## Knee Pain


Can you name the point of pain with palpation?



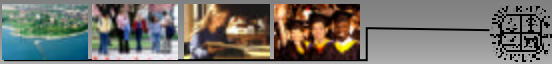
- Osgood Schlatter's Disease?
- Jumper's knee?
- PFA?
- Collateral ligament sprain?
- Meniscal tear?


## Osgood-Schlatter Lesion



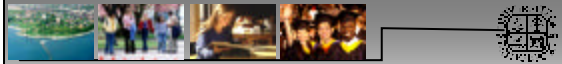
- Occurs between ages 10-15 with increased stress
- Genetic relationship (30% per family)
- Athletes 20% higher than non-athletes




## Osgood Schlatter's Lesion



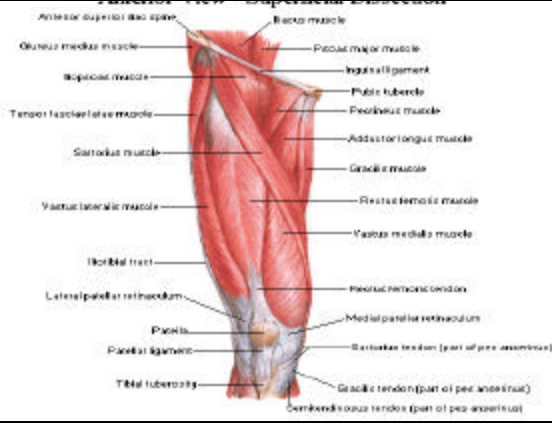
- Anterior tubercle of tibia inflammation with young athletes who run and jump
- Fracture may occur with an acute injury



## Muscles of the Thigh and Knee



- Please name the muscles of the thigh and knee.



Anterior superior iliac spine

Osteus medius muscle

Ilipsoas muscle

Tensor fasciae latae muscle

Sartorius muscle

Vastus lateralis muscle

Horital tract

Lateral patellar retinaculum

Patella

Patellar ligament

Tibial tuberosity

Biceps muscle

Pectus major muscle

Inguinal ligament

Pubic tubercle

Psoas muscle

Adductor longus muscle

Gracilis muscle

Rectus femoris muscle

Vastus medialis muscle

Medial patellar retinaculum

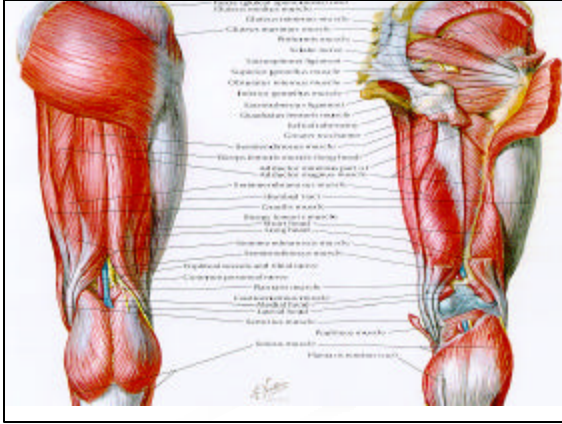
Medial collateral ligament

Medial patellar retinaculum

Sartorius tendon (part of pes anserinus)

Gracilis tendon (part of pes anserinus)

Semitendinosus tendon (part of pes anserinus)



Gluteus medius muscle

Gluteus minimus muscle

Gluteus maximus muscle

Hamstring muscles

Popliteus muscle

Superior genicular muscle

Chondral surface muscle

Anterior genicular muscle

Posterior genicular muscle

Oblique popliteal muscle

Oblique transverse muscle

Popliteal artery

Popliteal vein

Popliteal nerve

Popliteal fossa

Popliteal space

Popliteal artery and vein

Popliteal vein

Popliteal artery

Popliteal nerve

Popliteal space

Popliteal artery and vein

Popliteal vein

Popliteal artery

Popliteal nerve

Popliteal space

Popliteal artery and vein

Popliteal vein

Popliteal artery

Popliteal nerve

Popliteal space

Popliteal artery and vein

Popliteal vein

Popliteal artery

Popliteal nerve

Popliteal space

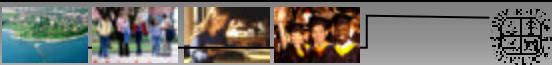
Popliteal artery and vein

Popliteal vein


Popliteal artery

Popliteal nerve

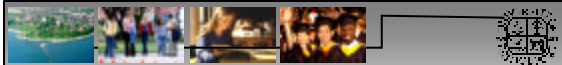
Popliteal space




## Radiograph of the Knee



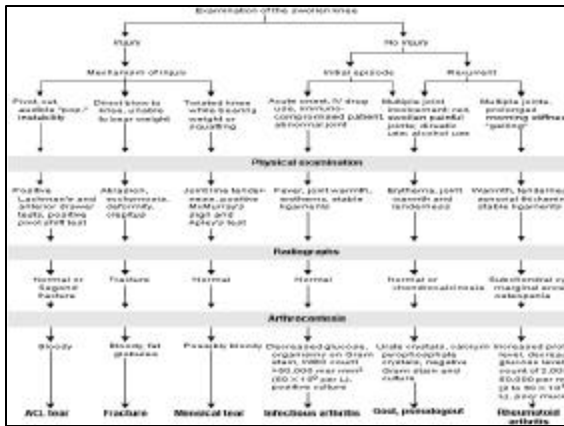
- Please identify ten anatomical structures of the knee.




## Evaluation of the Knee



- What type of injuries should we consider with our differential diagnosis of the knee?




## Knee ROM




- Flexion = 135-147 degrees
- Extension = -2 to 2

## Meniscus and Ligament Instability




- Apley's compression tests meniscus
- Apley's distraction tests nonspecific ligaments

## Meniscal Injury McMurray's Test




- Flex and extend with internal and external rotation.
- Stresses distorted meniscus
- Palpable or audible click is positive

## Meniscal Injury Retreating McMurray

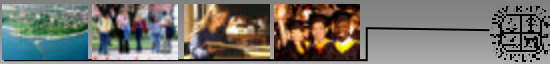


- Palpate medial meniscus with knee and hip flexed 90 degrees plus lateral and medial rotation

## Meniscal Injury Retreating McMurray



- Meniscal tear blocks medial rotation

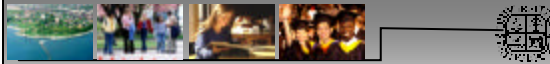


## Meniscal Injury

### Bounce Home Test




- Passive flexion of hip and knee
- Cup heel and request dropping of knee
- Femur rotation on tibia & extension blocked

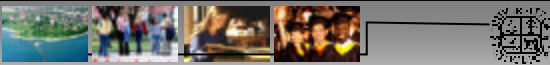


## Meniscal Injury

### Bounce Home Test




- Blockage or rubbery end feel with full extension are positive signs of meniscal injury

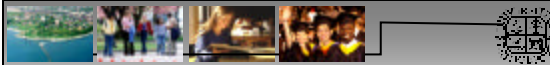


## Meniscal Injury

### Steinman's Tenderness Test




- Supine
- Hip and knee flexion to 90 degrees
- Palpate medial and lateral joint lines with index and thumb

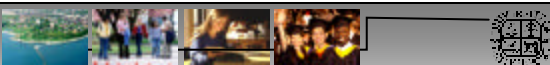


## Meniscal Injury

### Steinman's Tenderness Test




- Pain moving anteriorly or posteriorly with flexion and extension indicates meniscal injury.

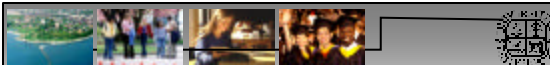


## Meniscal Injury

### Modified Helfet's Test




- Seated with foot on floor
- Note location of tibial tuberosity
- Extend leg and note location of tibial tuberosity

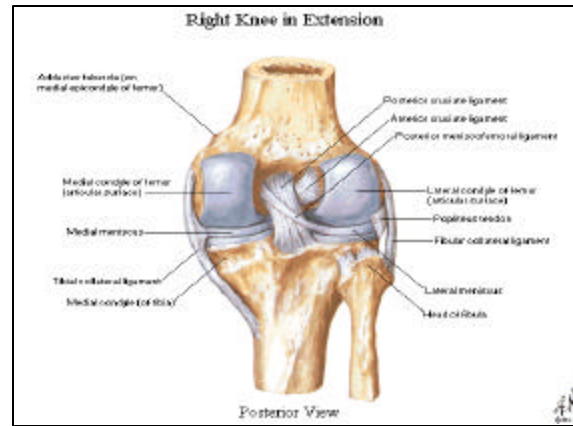
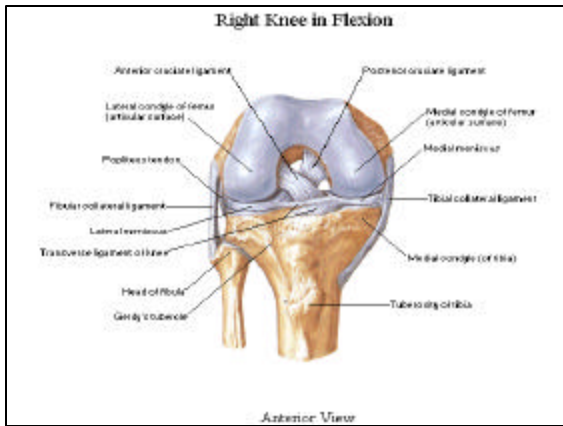


## Meniscal Injury

### Modified Helfet's Test



- Expect lateral movement of tibial tuberosity with extension of knee
- Blocked movement indicates meniscal injury



### Muscle Strain & Ligamentous Sprain Instability

- Please describe and grade a strain/sprain injury.


### Grading Strain & Sprain Injuries

- Grade 1: Microscopic tears
- Grade 2: Partial tears
- Grade 3: Complete tear with rupture

### Ligament Instability Anterior and Posterior Drawer Signs


### Anterior Drawer Sign and Lachman's Anterior Cruciate & Posterior Oblique

- Anterior translation of more than 5 mm indicates injury




## Anterior Drawer Sign

- Anterior cruciate
- Medial collateral ligament
- ITB
- Capsules & ligaments
- Arcuate-politeus complex




## Knee Ligaments

- Which are the most commonly injured ligaments in the knee?




## Ligament Injuries

- Medial collateral and anterior cruciate ligaments are the most commonly injured.




## Ligament Injuries

- What is the most common force or mechanism of injury to the knee?



## Ligament Injuries

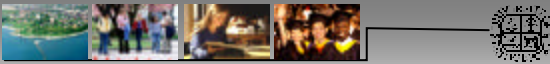
- Inward and medial force
- External rotation with some flexion




## Ligament Instability

### Lachman's Test

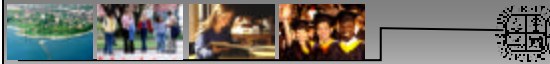
- Anterior and posterior cruciate ligament sprains
- Most reliable test for anterior cruciate ligament rupture



## Ligament Instability




- How would you grade a ruptured ligament?

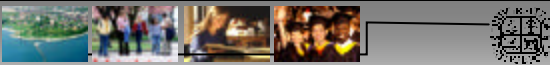


## Ligament Instability

### Slocum's Test




- Anterior cruciate
- Posteriorlateral capsule
- Fibular collateral ligament
- ITB

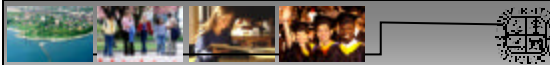


## Patellofemoral Dysfunction

### Patella Grinding Test




- Chondromalacia patellae
- Patellofemoral arthralgia
- Chondral fracture

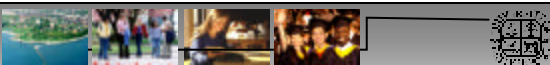


## Patellofemoral Dysfunction

### Patella Apprehension Test




- Pain and apprehension are present
- Positive test indicates lateral patellar dislocation

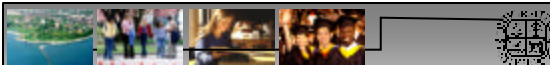


## Patellofemoral Dysfunction

### Dreyer's Test




- Patient cannot raise his leg while in a supine position

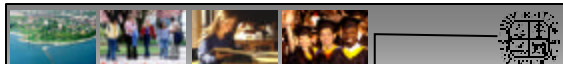


## Patellofemoral Dysfunction

### Dreyer's Test




- Stabilize quadriceps tendon and patient able to raise leg indicates traumatic fracture

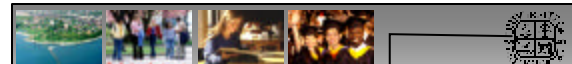


## Patellofemoral Dysfunction


### Clarke's Patellar Scrape Test



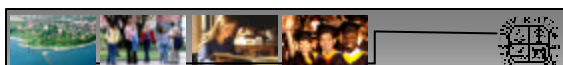
- Pain and crepitation may indicate patellofemoral arthralgia or chondromalcia patellae




## Quadriceps Angle "Q Angle"



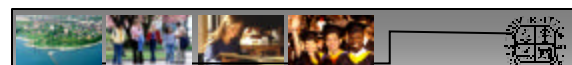
- Adults typically 15 degrees
- Increases or decreases in the q-angles are associated in cadaver models with increased peak patellofemoral contact pressures (Huberti & Hayes, 1984).




## Quadriceps Angle "Q Angle"



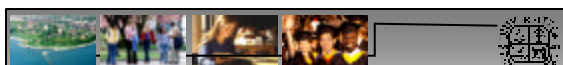
- Insall, Falvo, & Wise (1976) implicated increased q-angle, along with patella alta, in a prospective study of patellofemoral pain.



## Increased Q Angle

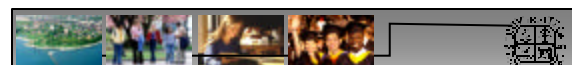


- Femoral anteversion
- External tibial torsion
- Laterally displaced tibial tubercle
- Genu valgus



## Patellofemoral Arthralgia

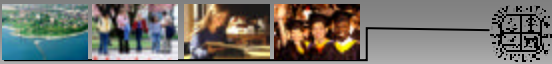
- Magnetic resonance imaging determination of tibial tubercle lateralization and patellar tilt correlates positively with the clinical diagnosis of anterior knee pain, suggesting that patellofemoral pain is caused by subtle malalignment.
- LEVEL OF EVIDENCE: Level III, development of diagnostic criteria on basis of nonconsecutive patients.
  - Arthroscopy. 2007 Mar;23(3):333-4; author reply 334.



## Inflammation

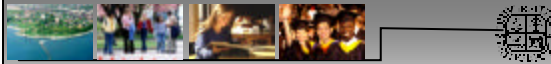
- A basic way in which the body reacts to infection, irritation or other injury, the key feature being redness, warmth, swelling and pain.
- Inflammation is now recognized as a type of nonspecific immune response.
  - MedicineNet.com






## Vascular Supply to Tendons

- Tendons have limited blood supply
- Each tendon receives its vascular supply from segmental vessels
- Wheelless' Textbook of Orthopaedics

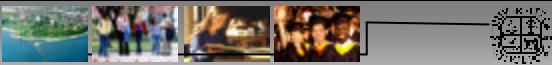


## Patellar Tendonitis


### “Jumper’s Knee”



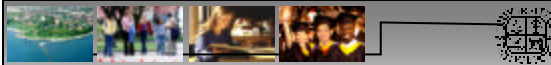
- Patellar tendonitis is an important cause of anterior knee pain.
- Patellar tendonitis and anterior knee pain. Am J Knee Surg. 1999 Spring;12(2):99-108. PMID: 10323501 [PubMed - indexed for MEDLINE]




## Tendonitis, Tendinitis, Tendinosis, Tendonopathy or Tendinopathy?



- Non-inflammatory degenerative changes
- Remodeling process
- Nodular development



## Treatment of Tendonopathy



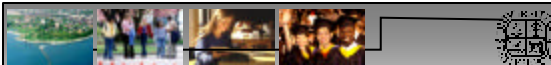
- Eccentric stretching
- NSAIDS contraindicated
- Prolotherapy (15% dextrose and lidocaine)



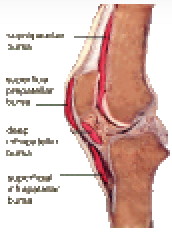
## Signs of Inflammation



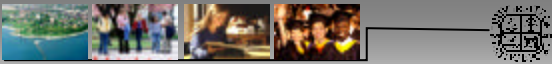
- Are you able to name the four signs of inflammation in Latin?




## Bursae of the Knee



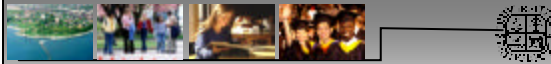
- Trauma, such as kneeling or contusion
- Dolor, rubor, tumor, calor are the four classical signs of inflammation.




## Palpation of the pes anserine bursa “Goose’s Foot”



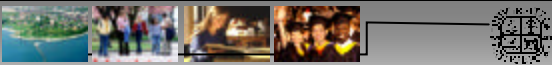
- Insertion of the conjoined tendons into the anteromedial proximal tibia.
- Pes anserine bursitis is rare.




## Pes Anserinus



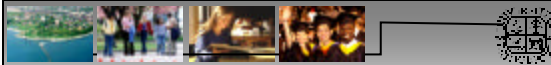
- From anterior to posterior, pes anserinus is made up of the tendons of the sartorius, gracilis, and semitendinosus muscles.
- Conjoined tendon lies superficial to the tibial insertion of the medial collateral ligament




## Baker’s Cyst Popliteal Cyst



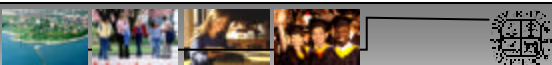
- There may be a painless or painful swelling behind the knee
- The cyst may feel like a water-filled balloon
- Occasionally, the cyst may rupture, causing pain, swelling, and bruising on the back of the knee and calf



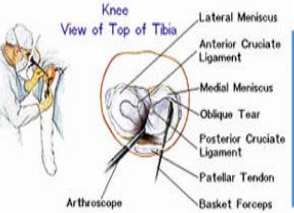
## Causes of Popliteal Cyst



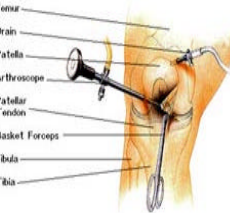
- An accumulation of synovial fluid
- Meniscal tears in children
- DJD in adults



## Arthroscopy: Knee I

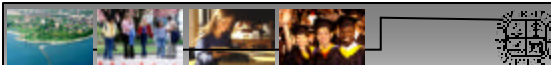


## Arthroscopy: Knee II




Labels for Knee I: Knee, View of Top of Tibia, Lateral Meniscus, Anterior Cruciate Ligament, Medial Meniscus, Oblique Tear, Posterior Cruciate Ligament, Patellar Tendon, Arthroscope, Basket Forceps.

Labels for Knee II: Femur, Drain, Patella, Arthroscope, Patellar Tendon, Basket Forceps, Fibula, Tibia.




## One Final Question...



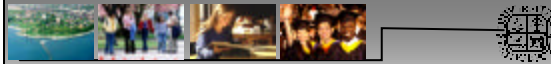
- Who is Brian Daubach?



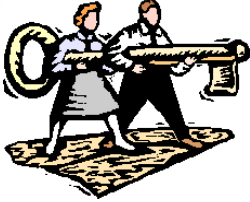
### Remember...



- It is an honor and a privilege to treat another human being.



### One Final Thought...



- Diagnosis is the key to successful treatment!