Knee Orthopaedic Tests
Orthopedics and Neurology DX 612

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Knee Injury
Strain, Sprain, Internal Derangement

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

Internal Derangement of Knee (IDK)

- Some physicians refer to IDK as “I don’t know.”

Accurate Diagnosis Improves Treatment Outcomes

- Know your anatomy
- Understand pain locations
- Master your special tests

Orthopedic Evaluation

- History
- Observation
- Palpation
- Range of motion
- Special tests
Anatomy of the Knee

- What 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 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.

Muscles of Thigh

Anterior View - Superficial Dissection

- Biceps femoris muscle
- Quadriceps muscle
- Patellar ligament
- Patellar tendon
- Patellar tendon (posterior aspect)
- Sartorius muscle (posterior aspect)
- Gracilis tendon (part of patellar tendon)
**Radiograph of the Knee**

- Please identify ten anatomical structures of the knee.

**Knee - Cruciate and Collateral Ligaments**

- Right Knee in Extension

**Evaluation of the Knee**

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

**Knee ROM**

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

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

Thessaly’s Test
- New test for the early detection of meniscal injury.
- http://www.ejbjs.org/cgi/content/abstract/87/5/955

Thessaly Test for Meniscus Tear
- Five degree of knee flexion
- Unaffected knee first
Thessaly Test for Meniscal Tear

External rotation assisted

Internal rotation

Positive findings

- Pain medial or lateral
- Clicking or locking
- Most accurate at 20 degrees of knee flexion

Right Knee in Flexion

Anterior cruciate ligament
Lateral condyle of tibia (articular surface)
Proximal tibia
Rearrach ligament
Tibial attachment of knee
Medial meniscus

Right Knee in Extension

Anterior cruciate ligament
Lateral condyle of tibia (articular surface)
Proximal tibia
Rearrach ligament
Tibial attachment of knee
Medial meniscus

Anterior View

Posterior View

TABLE II Values for Diagnostic Properties of the Clinical Examination Tests

<table>
<thead>
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<th>Test</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive Predictive Value</th>
<th>Negative Predictive Value</th>
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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.

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

Ligament Injuries

- Inward and medial force
- External rotation with some flexion

Lachman's Test

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

How would you grade a ruptured ligament?

Slocum’s Test

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

**Patella Grinding Test**
- Chrondomalacia patellae
- Patellofemoral arthralgia
- Chondral fracture

**Patella Apprehension Test**
- Pain and apprehension are present
- Positive test indicates lateral patellar dislocation

**Dreyer’s Test**
- Patient cannot raise his leg while in a supine position
- Stabilize quadriceps tendon and patient able to raise leg indicates traumatic fracture

**Clarke’s Patellar Scrape Test**
- Pain and crepitation may indicate patellofemoral arthralgia or chondromalacia 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

- Wheeless’ Textbook of Orthopaedics

Patellar Tendonitis “Jumper’s Knee”

- Patellar tendonitis is an important cause of anterior knee pain.

  PMID: 10529597 [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

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!