Objective

- Learn how to do a quick and thorough knee exam
- Be able to identify
  - Collateral ligament sprains/tears (LCL, MCL)
  - Cruciate ligament sprains/tears (ACL, PCL)
  - Meniscus injuries
  - Patellofemoral syndrome
  - Osteoarthritis
  - Osgood Schlatter Disease
  - Patellar tendinitis
  -Pes anserine bursitis
  - Illiotibial (IT) Band syndrome
Inspection

- Swelling/effusion, erythema, ecchymosis
- Knee angle
  - Genu varum (bowed legs)
  - Genu valgum (can predispose to patellofemoral syndrome)
Palpation

- Palpate the patient in the sitting position
- Start with the joint line
Palpation

- Joint line tenderness:
  - Meniscal injury
  - Osteoarthritis
  - Fracture
Next, find the inferior pole of the patella and palpate the patella tendon down to its insertion at the tibial tuberosity.
<table>
<thead>
<tr>
<th>Area of tenderness and probable swelling</th>
<th>Likely causes</th>
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<tbody>
<tr>
<td>Inferior pole of patella</td>
<td>Sinding-Larsen-Johansson syndrome</td>
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<tr>
<td>Patellar tendon</td>
<td>Patellar tendinopathy</td>
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<tr>
<td></td>
<td>Patellar rupture</td>
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<tr>
<td>Patellar insertion at tibial tuberosity</td>
<td>Osgood-Schlatter-Disease</td>
</tr>
</tbody>
</table>
Palpation

- When you are at the tibial tuberosity, palpate with your finger 1-2 cm medially.
- If the patient is tender there, consider Pes anserine bursitis.
Palpation

- Have the patient lay supine
- Start with palpating:
  - Medial and lateral femoral and tibial (epi)condyles & the fibular head:
    - Medial collateral ligament (MCL) sprain
    - Lateral collateral ligament (LCL) sprain
    - Iliotibial (IT) band syndrome
    - Tibial plateau fracture
    - Fibular head fracture
Palpation

- IT-band syndrome

![Diagram of Iliotibial Tract Friction Syndrome]

- Tensor fasciae latae m.
- Iliotibial tract
- Vastus lateralis m.
- Lateral femoral epicondyle
- Insertion of iliotibial tract into tibia

As knee flexes and extends, iliotibial tract glides back and forth over lateral femoral epicondyle, causing friction.

Area of diffuse pain and tenderness.
Palpation

- **Effusion: ‘Milking’**
  - Effusion is assessed by "milking" fluid distally from the suprapatellar pouch
  - Place one hand on the supra-patellar pouch. Gently push down and towards the patella, forcing any fluid to accumulate in the central part of the joint
  - Palpate the area adjacent to the patellar tendon for fluid accumulation

- If equivocal, compare with the other knee
Palpation

- **Effusion: Ballottement**

- A ballotable patella may be palpated after similar effusion milking
  - Place one hand on the supra-patellar pouch. Gently push down and towards the patella, forcing any fluid to accumulate in the central part of the joint
  - Gently push down on the patella with your thumb
  - If there is a sizable effusion, the patella will feel as if it is floating and ‘bounce’ back up when pushed down
Palpation

- After a trauma there is effusion (hemarthrosis) only if structures in the joint are involved:
  - Anterior cruciate or posterior cruciate ligament (ACL, PCL) injury
  - Meniscus injury
  - Patellar dislocation
  - Intra-articular fracture (e.g. tibial plateau fracture)

*Remember:* Sole collateral ligament (MCL, LCL) sprains will not cause an effusion

- Causes of non-traumatic effusion:
  - Osteoarthritis, rheumatoid arthritis, gout, pseudo gout, Reiter’s syndrome
  - Infections e.g. gonorrhea
  - Tumors
Inspection

- Patellofemoral syndrome (PFPS)
  - The “J” sign
  - The patient supine or seated and the knee extended from a flexed position. Lateral deviation of the patella can be observed during the terminal phase of extension
Palpation

- Next, clinical tests for patellar mobility and position, and provocative tests for pain should be performed:
  - patellar glide
  - patellar tilt and
  - patellar grind tests
- Positive results on these tests are consistent with the diagnosis of PFPS
- The patellar apprehension test is used to assess for lateral instability and is positive when pain or discomfort occurs with lateral translation of the patella
Palpation

- **Patellar glide**
  - Assesses patellar mobility
  - Displacement of more than three quadrants suggests patellar hypermobility caused by poor medial restraints predisposing for PFPS
  - Also, palpate the medial & lateral undersurface of the patella
Palpation

- **Patellar tilt**
  - Positive test = lateral aspect of patella is fixed and cannot be raised to at least horizontal position
  - Indicates tight lateral structures (e.g.: IT-band) predisposing for PFPS
**Palpation**

- **Patellar grind test**
  - The patient is in the supine position with the knee extended.
  - The examiner displaces the patella inferiorly into the trochlear groove.
  - The patient is then asked to contract the quadriceps while the examiner continues to palpate the patella and provides gentle resistance to superior movement of the patella.
  - The test is indicative of PFPS if pain is produced.
Palpation

- Apprehension test

- Patient is apprehensive if the examiner tries to move the patella laterally

- Positive after patellar (sub)luxation and in severe PFPS
Range Of Motion (ROM)

- Test for active & passive ROM while the patient is supine
  - Flexion 140°
  - Extension 0° /-10°
  - Internal rotation 10°
  - External rotation 10°

- Always compare to the other, “healthy” knee!
Special Tests: MCL

- Apply valgus stress with the knee at 0° and bent at 30°
  - 0° tests for MCL as well as the cruciate ligaments
  - 30° only tests the MCL
- Pain speaks for mild sprain
- Pain & laxity speak for moderate sprain
- No fix endpoint speaks for complete MCL rupture
Special Tests: LCL

- Apply varus stress with the knee at 0° and bent at 30°
  - 0° tests for LCL as well as the cruciate ligaments
  - 30° only tests the LCL
- Pain speaks for mild sprain
- Pain & laxity speak for moderate sprain
- No fix endpoint speaks for complete LCL rupture
Special Tests: ACL

- Lachman test
  - Patient supine with knee flexed 30°
  - Pull on the tibia towards you

- Anterior drawer test
  - Patient supine with knee flexed 90°
  - Stabilize patient’s foot by sitting on it
  - Cup your hands around patient’s knee & draw the tibia towards you
Special Tests: ACL

- Lachman & anterior drawer test are positive if
  - There is increased amount of anterior tibial translation compared with the opposite leg, and/or
  - There is no firm end-point
## Special Tests: ACL

<table>
<thead>
<tr>
<th>Test</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lachman test</td>
<td>85%&lt;sup&gt;[1]&lt;/sup&gt;</td>
<td>94%&lt;sup&gt;[1]&lt;/sup&gt;</td>
</tr>
<tr>
<td>Anterior Drawer test</td>
<td>68%&lt;sup&gt;[2]&lt;/sup&gt;</td>
<td>79%&lt;sup&gt;[2]&lt;/sup&gt;</td>
</tr>
<tr>
<td>Pivot Shift test</td>
<td>24%&lt;sup&gt;[1]&lt;/sup&gt;</td>
<td>98%&lt;sup&gt;[1]&lt;/sup&gt;</td>
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Special Tests: PCL

- Posterior drawer test
  - Stay in the same position as for the anterior drawer test
  - Push the tibia posteriorly
  - If it moves backwards the PCL is probably damaged
Special Tests: PCL

- Another way of testing the PCL is the sag sign
Special Tests: PCL

- Sag sign
Special Tests: Meniscus

- Mc Murray
  - Hold the knee with one hand, place your fingers along the joint line and flex it to 90°
  - Hold the foot by the sole with the other hand
Special Tests: Meniscus

- **Mc Murray (cont)**
  - Provide a valgus stress
  - Rotate the leg externally
  - Extend the knee
    - If pain or a ‘click’ is felt = ‘positive McMurray’ for a medial meniscus tear
Special Tests: Meniscus

- **Mc Murray (cont)**
  - Provide a varus stress
  - Rotate the leg internally
  - Extend the knee
    - If pain or a ‘click’ is felt = ‘positive McMurray’ for a lateral meniscus tear
Special Tests: Meniscus

- Apley grind test
  - The patient lays prone and flexes his/her knee 90°
  - Place your hand on the patient’s heel and push down (to compress the menisci between femur & tibia) while rotating internally & externally
  - Depending on the area of pain medial or lateral meniscus tear
Special Tests: IT-band Syndrome

- Ober’s Test

  The patient lies with the unaffected side down and the unaffected hip and knee at a 90-degree angle. If the IT-band is tight, the patient will have difficulty adducting the leg beyond the midline and may experience pain at the lateral knee.
Referred pain

- ‘Knee pain’ can be referred from the lumbar spine (e.g. herniated disk) or from a hip or ankle pathology, so don’t forget to
  - Do a gross hip and ankle exam
  - Test the motor strength, sensibility and deep tendon reflexes of the lower extremities
- And always examine both knees!
References

- Various articles from American Family Physician (www.aafp.org)
- Hoppenfeld *Physical Examination of the Spine & Extremities*
- Netter’s *Sports Medicine*