Functional Anatomy of the Knee

Chapter 16

Objectives

- Discuss the functional anatomy of the knee
  - Bones
  - Joints
  - Synovial membrane
  - Ligaments & Joint Capsule
  - Muscles
  - Bursae

Bones of the Knee

- Femur
- Tibia
- Fibula
- Patella
Joints
- Tibiofemoral
- Tibiofibular
- Patellofemoral

- Modified hinge joint
- Flexion & extension
- Some medial & lateral rotation

Articular cartilage
- Femoral condyles
- Tibial plateaus
- Backside of patella
Joints

- Synovial membrane
  - Baths the tibio-femoral joint in synovial fluid

Joints

- Joint capsule

Ligaments

- Medial (tibial) collateral (MCL)
- Lateral (fibular) collateral (LCL)
- Anterior cruciate (ACL)
- Posterior cruciate (PCL)
**Ligaments**

- **Medial (tibial) collateral (MCL)**
- **Lateral (fibular) collateral (LCL)**
- **Anterior cruciate (ACL)**
- **Posterior cruciate (PCL)**

**Posterior View**

**Medial (tibial) collateral (MCL)**
- Runs along medial side of knee - connects the medial femur to the medial tibia
- Provides stability against lateral force & rotational forces
- Deep portion attaches to medial meniscus
- A portion of fibers merge with the joint capsule

**Lateral (fibular) collateral (LCL)**
- Runs from lateral epicondyle of femur to head of fibula
- Provides lateral stability against varus & rotational forces
- Separated from the lateral meniscus by a small fat pad

**Anterior View**
Ligaments

Anterior Cruciate (ACL)
- Anterior aspect of intercondylar fossa of the tibia
- Posterior, medial aspect of the lateral femoral condyle

Provides stability against rotational forces
Prevents excessive posterior movement of the femur on the tibia
Weakest of the two cruciates

Anterior View

Ligaments

Anterior Cruciate (ACL)
- Provides stability against rotational forces
- Prevents excessive posterior movement of the femur on the tibia
- Weakest of the two cruciates

Anterior View

Ligaments

Posterior Cruciate (PCL)
- Posterior aspect of the intercondylar fossa of tibia
- Lateral, anterior medial condyle of the femur
- Provides stability against rotational forces
- Stronger of the two cruciates

Anterior View
**Ligaments**

- **Posterior Cruciate (PCL)**
  - Provides stability against rotational forces
  - Prevents excessive anterior movement of the femur on the tibia
  - Stronger of the two cruciates

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**Ligaments**

- **Cruciates**
  - Intraarticular
  - Extrasynovial

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**Menisci**

- **Medial**
- **Lateral**
Menisci

- **Medial**
  - Less mobile
  - Attaches to MCL
  - C-shaped
- **Lateral**
  - More mobile
  - O-shaped

Anterior View

Menisci

- **Medial**
  - Injured more frequently
- **Lateral**
  - Injured less frequently

Anterior View

Menisci

- **Functions**
  - Provide stability to joint
  - Provide smooth lubricated joint movement
  - Distribute forces
  - Absorb shock

Sagittal View
Menisci

- What happens if the menisci were removed?

Bursae

- Suprapatellar
- Prepatellar
- Superficial infrapatellar
- Deep infrapatellar

Bursae

- Semimembranosus
- Subpopliteal
**Bursae**
- Anserine bursa

**Muscles**
- **Quadriceps**
  - Rectus femoris
  - Vastus medialis obliques
  - Vastus lateralis obliques
  - Vastus intermedius

- **Hamstrings**
  - Biceps femoris
    - I: fibular head & lateral condyle of tibia
  - Semitendinosus
    - I: proximal medial tibia at pes
  - Semimembranosus
    - I: proximal medial tibia
Muscles

- **Gracilis**
  - I: Posterior medial tibia at pes
  - A: Knee flexion & medial rotation

Muscles

- **Sartorius**
  - I: Proximal medial tibia at pes
  - A: Knee flexion & medial rotation

Muscles

- **Popliteus**
  - O: Lateral condyle of femur
  - I: Posterior medial tibia
  - A: Medial rotation & knee flexion
Muscles

- Gastrocnemius
  - Posterior medial & lateral femoral condyles
  - Knee flexion

Questions?