Joints of the Lower Limb II
Lecture Objectives

• Describe the components of the knee and ankle joint.
• List the ligaments associated with these joints and their attachments.
• List the muscles acting on these joints according to the type and movement they perform.
• Describe the bursas in relation to these joints.
• Describe the stability of these joints.
• Describe the major palpable bony prominences of these joints.
Knee Joint

- Condyles of femur and condyles of tibia
- Hinge joint
  - Plane joint between femur and patella
- Flexion and extension and slight rotation
- Nerve supply: femoral, obturator, common peroneal, and tibial nerves
Knee Joint: Fibrous Capsule

- Attachment ...
- Capsule is missing anteriorly
  - Patella & tendons
- Gap posteriorly
  - Popliteus m. tendon
Knee Joint: Ligaments

• Extracapsular ligaments
  • Ligamentum patellae
  • Lateral collateral ligament
  • Medial collateral ligament
  • Oblique popliteal ligament
    • Expansion from the semimembranosus tendon
Fibular Collateral Ligament

- Lateral collateral ligament
- Attachments ....
- Popliteus tendon separates it from lateral meniscus
Tibial Collateral Ligament

- Medial collateral ligament
- Deep fibers attach to the medial meniscus
- Attachments ....
Knee Joint: Ligaments

- Intracapsular ligament
- Cruciate ligaments
  - Anterior cruciate ligament
  - Posterior cruciate ligament
Anterior Cruciate Ligament

• Attachments ...
• Orientation ...
• Prevents:
  • Posterior displacement of femur
  • Anterior displacement of tibia
  • Hyperextension
Posterior Cruciate Ligament

• Stronger
• Attachments ...
• Orientation ...
• Prevents:
  • Anterior displacement of femur
  • Posterior displacement of tibia
  • Hyperflexion
Cruciate Ligaments: Injury

- ACL injury is common
- PCL injury is rare
- Test of injury ......
Knee Joint: Menisci

- Medial & lateral menisci
- Type of tissue ....
- Shape .....  
- Edges ..... 
- Functions .......
Knee Joint: Medial Meniscus

- Attachments
  - Horns...
  - TCL
    - ↓ mobility
    - ↑ injury
Knee Joint: Lateral Meniscus

- Attachments
  - Horns
  - Popliteus tendon
- ↑ mobility
- ↓ injury
Knee Joint: Synovial Membrane

• Lines fibrous capsule
• Excludes ligaments, menisci, & infrapatellar fat pad
• Synovial membrane folds
  • Infrapatellar fold
  • Alar folds
Knee Joint: Bursae

- Anterior bursae
  - Suprapatellar bursa
    - Continuous with synovial membrane
    - Attached superiorly by articularis genus (from vastus intermedius)
      - Elevate bursa on extension
  - Prepatellar bursa
  - Superficial infrapatellar bursa
  - Deep infrapatellar bursa
Knee Joint: Bursae

• Posterior bursae
  • Popliteal bursa*
  • Semimembranosus bursa*
  • Four bursae related to muscles tendons
    • Biceps femoris
    • Sartorius and gracilis
    • Medial head of gastrocnemius
    • Lateral head of gastrocnemius

* Continuous with synovial membrane
Knee Movements

- Flexion ......
- Extension ......
- Rotation
  - Mostly at flexion
  - Medial rotation
    - Sartorius, gracilis, & semitendinosus
    - 5° to 10°
  - Lateral rotation
    - Biceps femoris
    - 30°
Proximal Tibiofibular Joint

- Lateral condyle of the tibia and head of fibula
- Plane joint
- Ligaments
  - Anterior and posterior ligaments
  - The interosseous membrane
- Nerve supply: common peroneal nerve
Distal Tibiofibular Joint

- Fibular notch and fibula
- Fibrous joint
- Ligaments
  - Interosseous ligaments
  - Interosseous membrane
  - Anterior and posterior ligaments
  - Inferior transverse ligament
- Nerve supply: deep peroneal and tibial nerves
Ankle Joint

- Distal end of tibia and fibula and the body of the talus
- Hinge joint
- Nerve supply: deep peroneal and tibial nerves
Ankle Joint: Ligaments

• Medial (deltoid) ligament
  • Stronger
• Lateral ligament
  • Anterior talofibular ligament
  • Calcaneofibular ligament
  • Posterior talofibular ligament
Ankle Joint: Movements

- Dorsiflexion
  - Anterior compartment mm.
- Planter flexion
  - Lateral and posterior compartments mm.
Ankle Joint: Injuries

• Ankle injury > other major joint in the body

• Ankle sprain
  • Mostly inversion injury
    • Lateral lig. sprain
      • Weaker
      • Mostly anterior talofibular lig.