Week 4 Notes: The Knee

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Contents

1 Anatomy

1.1 Bony

- **Femur** on top of **tibia** (fibula not part of it)
- Proximal
- Greater trocanter (proximal end)
- Flat bone base, round bone on top
- **Patella**: kneecap; increases moment arm for quads

- Patellar tendon (distal), quadriceps tendon (proximal)
- Irritation to surface of patella causes softening damagec

1.2 Ligamentous

- MCL/LCL: Medial/lateral collateral ligament
- ACL/PCL: Anterior/posterior cruciate ligament
  - ACL has two bundles: alternately tighten when knee flexes/extends; prevents axial rotation and translation
- Anterolateral ligament

1.3 Soft tissue

- **Joint capsule**: seran wrap holding in synovial fluid
  - **Synovial fluid**: clear, sticky fluid, lubrication for joint, nutrition for articular cartilage, menisci
- **Menisci**: medial and lateral
  - Sit on top of tibial plateau, attached on side of plateau
  - Help distribute load and contact pressure
  - Role in proprioception: have nerve endings
  - Important for treatment: only outer third has blood supply, inside only from synovial fluid

1.4 Musculature

- Quadriceps: four muscles to extend the knee
  - Vastus lasteralis
  - Vastus medialis
  - Rectus femoris, also for flexing hip
  - Vastus intermedius
- Hamstrings: knee flexors and extend the hip
  - Semimembranosus, etc.

2 Common pathologies

2.1 Ligament tears

- ACL tear
  - Very common, and serious
  - Most often (70%) non-contact injury
  - Often caused by planting foot and turning
  - "Heard a pop", immediate swelling, knee instable
  - Diagnose with Lachman test: check for translation and check for "firm end point"
  - Women at greater risk than men: training (controlled landing of jumps), anatomical (relaxin, Q-angle (knees inward)), estrogen factors
  - Treatment:
    - Some people do okay, hamstrings help out
    - "Rule of thirds": 1/3 surgery, 1/3 fine, 1/3 do fine with lowered activity
    - Need surgery for high performance
      - **Reconstruction surgery** rather than repair: tissue graft
      - **Allograft**: reconstruction from cadaver: faster but immune system response
      - **Autograft**: donor site morbidity, longer surgical time, no immune system response: part of patellar or hamstring tendon
      - Synthetic graft tends to not work, strong immune response
      - **Graft fixation screws**: screw next to graft for fixation
- PCL Tear
  - Not as common or serious
  - Often due to trauma, usually with other ligamentous injury
  - Due to hyperflexion of knee
  - Diagnose with "lag sign"
- MCL/LCL

  - MCL more commonly injured due to blow from outside of knee
  - Treat conservatively: big and heal well

2.2 Meniscal tears

- More common in males
- 1/3 associated with ACL
- Often twisting injury
- Able to walk after injury, insidious onset of swelling/stiffness
- Eventual leads to painful clicking, popping, locking
- Treatment
  - Repair
    * Motivation, compliant patient is best; best repair is vertical longitudinal in vascular zone
    * Sutures versus devices ("staples")
    * Trephination: making holes for bleeding to help healing
  - (Partial) meniscectomy: (keep as much as possible)
    * Remove abnormally mobile fragments or any part that's not "doing any good"
    * Keep nice contour
  - Rehab:
    * After repair, very weak, have to move very slowly for a long time

2.3 Patellofemoral pain

- Anterior knee pain ("my knee hurts" and not arthritis)
- Diagnosis: almost always worse going down stairs
- Usually due to incorrect tracking of patella

2.4 Knee dislocation

- Emergency: three or more of the main ligaments have town
- One of two or three orthopaedic emergencies
- Can easily cause loss of leg

2.5 Treatment of articular cartilage defects

- Some of the articular cartilage flapping around
- **Debridement**: clean up thing that's flopping around, cut out loose body ("crabmeat")
  - Be wary of hole: three main ways to handle:
    - Jab bone to get bleeding and bone marrow, build new (fibro)cartilage, slow
    - OATS: osteochondral autograft transfer surgery: take some from non-weight-bearing region, tricky, create new defect
    - ACI: autologous chondrocyte implantation: get sample, add pixie dust (magic cells), put it back in after 4-6 weeks
    - PRP: platelet-rich-plasma: current research

2.6 Journal club

- Published in a big journal, so important paper

3 Other

- MRI T1 images are good for anatomy, bright image
- MRI T2 images are good for pathology, fluid shows up bright
- "Ambulate" = walk