ACUTE KNEE INJURIES

Joseph Chorley, M.D.
Associate Professor of Pediatrics
Baylor College of Medicine
Primary Care Sports Medicine
Goals and Objectives

• To be able to recognize the causes of the acutely injured knee.
  - Know the big 7 acute knee injuries
  - Know the historical points that differentiate these injuries

• To be able to see imaging to substantiate the correct diagnosis
THE BIG 7

• ACL
• MCL
• Meniscus
• Patellar dislocation
• Fracture
• PCL with or without LCL
• Fat Pad Impingement
Mechanism of Injury

• Twist, pivot

• Irregular landing

• Valgus

• Direct trauma

• Hyperextension
Twist pivot cut (non-contact)

• ACL
• MCL
• Meniscus
• Patellar Instability
Hyperextension

• ACL

• Fat pad impingement with posterior capsule/oblique popliteal ligament strain, Kissing lesion bone bruises

• PCL
Twist with a flexed knee

• Patellar instability

• ACL
Valgus blow to the knee

- ACL
- MCL
- Meniscus
Direct blow to the front of the tibia

- PCL injury

Dashboard injury

Slip and fall on the front of the tibia
PCL, ACL, and Meniscus
ANTERIOR CRUCIATE LIGAMENT TEAR

**SYMPTOMS**
- loud sometimes audible pop
- instability or shifting sensation "knee went out"
- pain

**SIGNS**
- effusion
- decreased range of motion
- positive anterior drawer, Lachman's maneuver, and/or pivot shift

**Pearls**
- must be weight bearing to tear
ACL injury

• Valgus
• Pivot
• Hyperextension
KISSING LESIONS

SEGOND FRACTURE
AVULSION FRACTURE AT THE TIBIAL SPINE
PCL + LCL
Arcuate Ligament
KNEE FRACTURES

- DISTAL FEMUR
  - epiphyseal
- PROXIMAL TIBIAL
  - tibial eminence
  - epiphyseal
- PATELLAR
- OSTEOCHONDRALE
- CHONDRALE
KNEE FRACTURES

• SYMPTOMS
  • pain
  • immediate disability

• SIGNS
  • obvious deformity
  • rapid effusion
  • neurovascular compromise

• PEARLS
  • 20% of patients with a hemarthrosis have some chondral/osteochondral fracture
Ottowa Knee Rules

An x-ray is indicated if the patient has any of the following features:

Age > 55 years
Inability to bear weight both immediately and in the emergency department (4 steps) **
Isolated tenderness of the patella*
Tenderness at head of fibula
Inability to flex to 90°

*No bone tenderness of knee other than patella
**Unable to bear weight twice onto each limb regardless of limping
Pittsburgh Knee Rules

• Primary criteria (required)
  - Blunt trauma or fall type injury

• Secondary criteria (one of the following present)
  - Age younger than 12 years or over 50 years
  - Inability to walk four weight bearing steps in ER
Salter Harris Fracture Classification System

The Salter-Harris Classification of Growth Plate Injuries
Avulsion Fracture of the Tibial Tuberosity

Type Ia

Type IIa

Type IIIa
ACL IN KIDS = THINK AVULSION
FRACTURE TIBIAL SPINE
MENISCAL TEAR

• Incidence 60 per 100,000
  • peak [men 20-40, women 11-20]
• medial meniscus torn twice as often as the lateral meniscus
• 80% of all meniscus tears involve the posterior meniscus
• higher potential for healing if tear located in the vascular peripheral 1/3
• 80% of those with chronic ligament tears have meniscal tear
MENISCAL TEAR

• SYMPTOMS
  • tearing or tightness feeling
  • pain sudden and sharp
  • locking or loose body feeling

• SIGNS
  • effusion
  • pain to palpation along the joint line
  • decreased range of motion
  • positive McMurray's test

• Pearls
  • must be weight bearing to tear
Meniscus
Complex tears
MEDIAL COLLATERAL LIGAMENT TEAR

• SYMPTOMS
  • medial pain
  • little to no effusion

• SIGNS
  • pain to palpation medially
  • positive valgus testing

• Pearls
  • there is no joint opening with valgus testing at 0 degrees with an isolated MCL injury
PATELLAR DISLOCATION/ SUBLUXATION

• "THE GREAT IMITATOR"

• SYMPTOMS
  • pain often medial
  • immediate disability
  • spectacular ripping sensation

• SIGNS
  • immediate massive hemarthrosis /no swelling
  • palpable medial defect
  • pain to palpation medially especially over medial retinaculum
  • positive patellar apprehension test
Hyperextension with fat pad impingement

• Pain with hyperextension
  - Jumping
  - Laying prone off end of the bed

• Pain is both anterior and posterior
Components of the posteromedial corner.

At this level the semimembranosus (SM) can be seen contributing fibers to the oblique popliteal ligament (OPL) and to the posterior capsule. The posterior oblique ligament (POL) is found between the superficial medial collateral ligament (SMCL) and the semimembranosus tendon on this view.
OSTEOCHONDRODritis DISSECANS

• SYMPTOMS
  • locking
  • loose body feeling
  • may or may not have pain
  • may or may not have effusion

• SIGNS
  • positive Wilson's test
  • may have positive McMurray's test
  • may be normal
Diagnostic Imaging

• Magnetic Resonance Imaging
IMMEDIATE REFERRAL

• Immediate rapid effusion
• Obvious deformity
• Acute locking of the joint
• Penetrating wound into the joint, muscle or tendon
• Neurovascular comprise
• Joint instability
URGENT REFERRAL

• Knee effusion
  • If able to get to a sports medicine trained specialist within the first 2 hours, do so.
  • If unable to get to a sports medicine trained specialist within the first 2 hours, start acute rehab and refer during the first week.

• Athletes with a knee injury

• Inconsistent mechanism of injury and physical exam
ACUTE TREATMENT

- Minimize swelling
- Minimize pain
- Minimize loss of strength
- Minimize loss of range of motion
PRICEMMMS

- P-Protection
- R-Relative Rest
- I-Ice
- C-Compression
- E-Elevation
- M-Medications
- M-Modalities
- M-Motion
- S-Strengthening
PROTECTION

• Crutches
  • proper technique
  • nonweightbearing until able to do a good quad set
  • wean from crutches when able to perform normal heel toe gait
• Knee Immobilizer
  • questionable benefit in most situations
• Return to play criteria
RELATIVE REST

- **DO NOTHING THAT HURTS**
  - pain is your body's way of saying that you are doing an activity that is too demanding for it to perform
- **IF YOU LIMP, YOU NEED CRUTCHES**
  - not allowing the healing process to strengthen weak damaged tissues
  - biomechanical changes in normal gait will cause abnormal stresses to other point up the kinetic chain
  - improper gait may predispose to secondary injury
ICE

• Benefits of ice:
  
  Pain Control
  Decrease swelling

• How long do use ice?

  As long as there is pain and swelling
ICE

• 20 MINUTES EVERY HOUR when possible
  • use a bag of crushed ice or frozen peas
  • put bag directly on the skin
  • anticipate mild burning stinging sensation at 3-5 minutes before onset of anesthesia

• THINGS TO AVOID
  – contraindications to ice (Raynaud's, impaired sensation, peripheral vascular disease, cold hypersensitivity)
  – avoid refreezing cold gel packs
  – never sleep with ice
  – watch the peroneal nerve laterally
DIRECTED COMPRESSION

- Get edema out of the vital areas and back into the circulation
  - doughnut shaped 1/4 inch felt pads
  - elastic wrap, compression hose
  - be sure wrap from the midcalf to the midthigh
ELEVATION

• Get edema moving back toward the heart and away from getting stuck in the lower leg
• Optimally above the level of the heart
MEDICATIONS

• ANALGESICS
  • acetaminophen with or without codeine
• ANTIINFLAMMATORYIES (initially scheduled, then as needed)
  • ibuprofen 10mg/kg or 800mg TID
    • OTC 200mg tabs-4 pills TID
  • naproxen 500mg BID
    • OTC 220mg tabs-2 pills BID
• TAKE WITH MEALS TO DECREASE GI SIDE EFFECTS
MODALITIES

- electrical muscle stimulation may assist with analgesia and in maintaining quadriceps muscle strength in those patients who cannot organize a "quad set"
RANGE OF MOTION

• Extension
  • legs propped up
  • quad contractions
  • prone with leg over edge of bed
• Flexion
  • supine heel slides to buttocks
  • chair slides
STRENGTH

- Concentrate on the Quadriceps
  - quad sets [5 repetitions of 10 seconds AT LEAST 5 times a day]
  - straight leg raises
- Hamstrings
  - isometric hamstring curls
  - hamstring curls with resistance
SUMMARY

- Know the knee anatomy
- Remember the 7 most common causes of acute knee injuries
- Take a good history
- Go systematically through your physical exam
- Get X rays when necessary
- Refer when necessary
- Start rehab as soon as you discharge the patient