Additions:
- lumbar spine/spondy
- panners?
- Elbow dislocation?
16 y.o. female swimmer has had right shoulder pain for the past 6 months. Ultrasound treatment and rest have failed to provide relief. Examination reveals bilateral 2+ glenohumeral translation, hyperextensible elbows, and a positive impingement sign. Management should consist of

1. Corticosteroid injection
2. Scapular muscle and rotator cuff strengthening
3. Arthroscopic capsular shift
4. Arthroscopic thermal capsulorrhaphy

Young females tend to be very ligamentously lax and have problems with instability of the shoulders (multi-directional) and kneecap. First line treatment is not surgical. It is rehabilitation.
Etiology

- Primary (congenital):
  - Inherited congenital ligamentous laxity
    - Ehlers-Danlos
    - Marphan
  - Other forms of generalized ligamentous laxity
  - + familial history
Etiology

- **Acquired:**
  - Repetitive microtrauma to shoulder
    - Swimmers
    - Weight lifters
    - Gymnasts
    - Throwing / racquet sports
**HISTORY**

- **Age:**
  - Younger than 35 y.o.

- **Symptoms:**
  - Pain
  - Instability
  - Weakness
  - Paresthesia
  - Fatigue
  - Popping, clicking, grinding
  - “dead arm syndrome”
  - **Traction paresthesia:** CLASSIC !!
PHYSICAL EXAMINATION

- Cervical spine
- Scapulothoracic joint
- Other joints:
  - Elbow: hyperextension
  - MCP: hyperextension
  - Knee: genu recurvatum, patellar subluxation
  - Thumb: adduction to reach ipsilateral forearm
Rehabilitation

- Proprioception
- Rotator Cuff strengthening
- Scapular Stabilizer strengthening
- Proper biomechanics
An 18 year old high school football player is attempting to make a tackle when his arm is forced into an abducted and externally rotated position. He falls to the ground in pain and is unable to continue. Examination on the sideline reveals significant shoulder pain and an inability to actively or passively internally rotate the arm. The most likely diagnosis is:

1. Anterior shoulder dislocation
2. Rotator cuff tear
3. Impingement
4. A “stinger” or “burner”
Shoulder Physical Exam

- Other Provocative tests
  - Instability tests
    - Relocation, Apprehension, Drawer tests
MR Arthrogram

- Labral pathology
- Small Cuff tears (young patients)
Rehabilitation

- Avoid apprehension position x 3 months
  - Proprioception
  - Rotator Cuff strengthening
  - Scapular Stabilizer strengthening
  - Proper biomechanics
  - Bracing
Operative repair

- Indications based on
  - Frequency of dislocations
  - Age of patient
  - Bone loss
  - < 25 years
    - Bankart lesion
      - MRI
      - Arthroscopy
    - Operative repair
  - > 45 years
    - Rotator cuff tear highly likely
      - MRI
    - Repair cuff
Bankart Repair
A 13 year-old soccer player attempts to avoid an oncoming defender by making a rapid cut and change of direction. As she pivots to change direction, she hears a loud pop in her knee. She tries to continue playing but has a moderate amount of discomfort in her knee, and her knee “gives out” on her the next time she tries to make a rapid change in direction. Her knee swells a great deal in the next few hours. The most likely diagnosis is

1. Meniscus Tear
2. Anterior Cruciate Ligament Tear
3. Patellar Tendon Rupture
4. Chondromalacia patella/patella maltracking
ACL Injury

- Mechanisms: Contact vs. Non-contact
- #1: Forced valgus in external rotation: causes disruption of the MCL and medial supporting structures (clipping injury)
- #2: Hyperextension, associated with a meniscus tear (volleyball, gymnastics, basketball)
- A sudden deceleration to change direction can also produce an anterior drawer force on the proximal tibia from forceful quadriceps contraction (football players, basketball)
ACL Injury on MRI

Normal ACL

Torn ACL
ACL Surgery

Graft Options

Autograft
- Patellar tendon
- Hamstrings
- Quad tendon

Allograft
- Patellar tendon
- Achilles tendon
- Hamstrings

GROWTH PLATES MUST BE CONSIDERED!!!
Growth Plates Must Be Considered!!!

- Hardware or Bone plugs crossing growth plates likely to cause growth arrest and angular deformity.
- One option: non-transphyseal or partial transphyseal reconstruction (over the top technique on femoral side).
- Recent reports show success with transphyseal tunnels and soft tissue graft (hamstrings), fixation away from physes.
Physeal Sparing ACL Reconstructions

Non-transphyseal ACL reconstructions

“Over the top” Femoral Fixation Method

Partial transphyseal ACL reconstruction
Intra-articular Reconstruction
Hamstrings with Endobutton Technique
Tibial Eminence Fractures

- Avulsion of ACL instead of intrasubstance tear
- More common in skeletally immature patients
- Even if repaired may have residual instability due to intrasubstance ACL injury
Tibial Eminence Fractures - TX
An 14 year old gymnast turns on a planted foot while performing a tumbling routine and dislocates her patella for the first time. The kneecap spontaneously reduces as she attempts to straighten her knee out. The following are appropriate treatment steps except:

1. Aspiration of hemarthrosis
2. Immediate surgery in the absence of a large osteochondral fragment
3. Crutches
4. Physical therapy
5. Use of patellofemoral stabilization brace
Patellofemoral Instability

Literature Review: Natural History

- Avg. age 14-15 yrs. (10-27)
  - rare after age 30
  - Female: Male 3:1
- Recurrence Rate 15-44%

Associated Risk Factors

- Ligamentous Laxity
- Patellar Malalignment
  - ALTA
  - Increased Q-Angle
Patellofemoral Instability

Evaluation - Radiographs

**Insall Ratio**
1.4

**MUST RULE OUT**
OSTEOCHONDRAI/ CHONDRAI FRACTURE
Management - Non-operative

**Acute management**

- often relocate spontaneously
- aspirate hemarthrosis (optional)
- cryocuff / crutches

**MUST RULE OUT**

OSTEOCHONDRAL/ CHONDRAL FRACTURE!!! Present 40-55% of time
Patellofemoral Instability

Management - Operative

“Acute” Surgery: Not the Standard of Care

CONTROVERSIAL- Young athlete with dislocation by indirect mechanism. Recent reports site <10% incidence of redislocation if acute repair of MPFL +/- VMO

- YES- “First time dislocator” with presence of displaced osteochondral fracture
A 12 year old boy sustains an injury to his knee while playing football. Exam reveals diffuse tenderness, a 2+ effusion, and restricted range of motion. He has 2+ laxity with valgus stress. Which of the following imaging studies will best aid in diagnosis:

1. Bone scan
2. MRI
3. CT
4. Bone age Xrays
5. AP and lateral Xrays with and without stress

Skeletally immature: physes and bone fail before ligaments!

Stress view Xrays often diagnostic

Intrarticular Effusions rare with isolated MCL

If large effusion, think ACL, patella dislocation, or fracture
Physeal Injury

- Injury to distal femoral physis more common than proximal tibial physis

History/Mechanism
- Direct force to knee usually varus or valgus (clipping)
- Pain out of proportion!!!
Physeal Injury

P/E
- Large effusion
- Tender joint line or physis
- Rule out ligamentous laxity
- Compare vs nml knee

Diagnostic Tests
- X-ray including stress views
- Exam under stress view
Physeal Injury

Complications

- Neurovascular injury
- Compartment syndrome
- Growth disturbance
- Associated ligament injury

Treatment

- Closed reduction and casting 4-6 weeks
- Occasional Closed/Open reduction and pinning
- Follow for growth disturbance
- Epiphysiodesis to prevent angular deformity or leg length discrepancy
The parents of a 6 year old boy report that he frequently limps, and they note popping in his right knee when they bathe him. He has no pain. MRI is shown. What is the best course of action?

1. Saucerization and possible suture stabilization
2. Cast immobilization
3. Incisional biopsy
4. Drilling and screw fixation
5. Needle aspiration

Discoid meniscus may present in children less than 10 with knee snapping due to unstable meniscus.
Discoid Meniscus

- **Description:**
  - Meniscal tissue covers entire tibial plateau (coin shaped) with variable peripheral attachments
  - Most commonly lateral meniscus

- **Clinical signs:**
  - Often asymptomatic
  - When symptomatic, may present with popping, clicking, catching symptoms, tenderness lateral joint line
Discoid Meniscus

- Tear
- Saucerized
The following pediatric conditions generally require surgical intervention except:

1. Osgood Schlatter’s Disease
2. Patella dislocation with significant osteochondral fragment or locking symptoms
3. Locked bucket handle meniscus tear
4. Periosteal Sleeve avulsion
5. Displaced Osteochondritis Dissecans lesion
Osteochondritis Dissecans

- Avascular necrosis of osteochondral fragment
- Usually lateral aspect of medial femoral condyle
Osteochondritis Dissecans

Hx - Vague knee pain; may have locking symptoms, may have acute large effusion

Wilson’s sign

Dx - X-rays

MRI (Stage lesion)

Arthroscopy
Osteochondritis Dissecans
Osteochondritis Dissecans

Treatment

- Management determined by age of patient and stage of lesion
- Young children more likely to heal stable lesions than older children
- Older children may require pinning/stabilization of fragment or osteochondral graft replacement
OSTEOCHONDRAL DEFECT