Overview
• Quick approach to MSK problems
• Highlight common presentations
• Joint by joint
• Discuss basics of conservative and surgical management

History is Key
Who? What? When? Acute vs Chronic (2 weeks? 6 weeks?)
Where? Think anatomy
How? One finger test
Mechanism of injury

Red Flag Symptoms
• Severe disability
• Numbness and tingling
• Night pain
• Constitutional symptoms (fever, wt loss)
• Swelling with no injury
• Systemic illness
• Multiple joint injury

Why?
Intrinsic Risk Factors
• Growth
• Anatomy
• Muscle/Tendon imbalance
• Illness
• Nutrition
• Conditioning
• Psychology

Extrinsic Risk Factors
• Training
• Technique
• Footwear
• Surface
• Occupation

It’s all about Physics…
Newton’s Law #1
• An object in motion, stays in motion
• Unless an external force stops it

Newton’s Law #2
• Force = mass x acceleration
• Force results in stress
Shock Absorption

Newton’s Law #3
• Every force has an equal and opposite force
• “Striking” mass
• “Shock” absorption

Physical Exam

LOOK – Observation
• Swelling, Erythema, Atrophy, Deformity, Surgical Scars (SEADS)

SPECIAL TESTS
• Provocative tests
  • Reproduce patient’s pain

FEEL – Palpate important structures

Stress tests
• Stress structures for instability (i.e. ligaments)

MOVE – Assess Range of Motion

Functional tests
• Assess functional movements (i.e. weight bearing activity)

Diagnostic options

Imaging
• X-ray
• Ultrasound
• Bone scan
• CT
• MRI

Others
• EMG/NCS
• Diagnostic injection
• Arthrocentesis
• Bloodwork
• Neuropsych testing
• Arthroscopy

Initial Treatment

• MICE = Modified activity, Ice, Compression, Elevation
• Immobilization = Consider bracing, crutches
• Begin early Physical Therapy
• Analgesia usually NSAIDs
• Referral to Orthopaedics/Sports Medicine

Treatment Options

Conservative
• MICE (Modified activity, Ice, Compression, Elevation)
• Medications/Analgesia
• Rehabilitation therapy
• Casting/Braces/Orthoses
• Crutches

Surgery
• Reconstruction
• Repair
• Re-align
• Remove internal derangement
• Replace joint

Anatomy of the Foot

• Plantarflexors propel body forward

“Toe Off” involves the 1st MTP joint

Swing Phase (38%)
Anatomy of the Ankle

- Hinge Joint
- Talocrural Joint
- Dorsiflexion, plantarflexion
- Subtalar joint
- Inversion, eversion
- Moves like an angled hinge

Ankle Ligaments

Lateral Collateral Complex
- Anterior talofibular lig.
- Calcaneofibular lig.
- Posterior talofibular lig.

Medial Ligament Complex
- Deltoid ligament
- Superficial and deep ligaments

Ankle Sprains

Mechanism
- Inversion, plantarflexion (most common injury)
- Eversion (Pronation)

Symptoms
- Localized pain usually over the lateral aspect of the ankle
- Difficulty weight bearing, limping
- May feel unstable in the ankle

Physical Exam

LOOK, FEEL, MOVE

Special Tests
- Anterior Drawer Test
- Subtalar Tilt Test
Grading Ankle Sprains

<table>
<thead>
<tr>
<th>Grade</th>
<th>Drawer/Tilt Test results</th>
<th>Pathology</th>
<th>Functional Recovery in weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drawer and tilt negative, but tender</td>
<td>Mild stretch with no instability</td>
<td>2 – 4</td>
</tr>
<tr>
<td>2</td>
<td>Drawer lax, tilt with good end point</td>
<td>ATFL torn, CFL and PTFL intact</td>
<td>4 – 6</td>
</tr>
<tr>
<td>3</td>
<td>Drawer and tilt lax</td>
<td>ATFL and CFL injured/torn</td>
<td>6 – 12</td>
</tr>
</tbody>
</table>

Ottawa Ankle Rules

- Inability to weight bear immediately and in the emergency / office (4 steps)
- Bone tenderness at the posterior edge of the medial or lateral malleolus (Obtain Ankle Series)
- Bone tenderness over the navicular or base of the fifth metatarsal (Obtain Foot Series)
- Sens 97%, Spec 31-63%, NPV 99%, PPV <20%


Which X-rays?

**AP ankle**
- Medial clear space (2-3 mm)
- Tibiofibular overlap (6 mm)

**AP mortise**
- Joint space symmetric (2-3 mm)
- Tibiofibular overlap (at least 1 mm)

**Lateral view**
- Foot neutral

Treatment of Ankle Sprains

**Acute**
- Rest or modified activities
- Ice, Compression, Elevation
- Crutches PRN
- Bracing (Grade 2 and 3)
- Early Motion is essential
Rehab, Rehab, Rehab

Physical Therapy
• Pain control
• ROM
• Stretching
• Strengthening
• Proprioception / Balance exercises (i.e. Wobble Board)

“High Ankle” Sprains

Mechanism
• Dorsiflexion, eversion injury
• Disruption of the Syndesmotic ligaments, most commonly the anterior tibiofibular ligament
• R/O Proximal fibular fracture

External Rotation Stress Test

• Fix tibia
• Foot in neutral
• Dorsiflex and externally rotate ankle

Squeeze test

• Hold leg at mid calf level
• Squeeze tibia and fibula together
• Pain located over anterior tibiofibular ligament area

Treatment for Syndesmosis Injury

Conservative
• Cast or walking boot
• Protected weightbearing with crutches must be painfree
• PT

Surgery
• May needs ORIF if unstable

Maisonneuve Fracture

Not Always Only a “Sprain”

Ligaments
• Subtalar joint sprain
• Sinus tarsi syndrome
• Syndesmotic sprain
• Deltoid sprain
• Lisfranc injury
• Tendons
• Posterior tibial tendon strain
• Peroneal tendon subluxation

Bone
• Osteochondral talus injury
• Lateral talar process fracture
• Posterior impingement (os trigonum)
• Fracture at the base of the fifth metatarsal
• Jones fracture
• Salter fracture (fibula)
• Ankle fractures
Prevention – Ankle Bracing

- Ankle braces, tape and proprioceptive training help reduce the risk of lateral ankle sprains
- There was a significant reduction in the number of ankle sprains in people allocated to an external ankle support (RR 0.53, 95% CI 0.40 to 0.69).
  - Handoll et al. Cochrane Database Rev, 2005

Ankle Proprioception

- Physical Therapy
- Regain neuromuscular control
- Balance exercises
- Gait retraining

Prevention Proprioception Training

- RCT (randomized by team)
- N= 765, 55 teams, M/F, high school basketball and soccer players
- At least 4 weeks, balance training program
- Training reduced the rate of ankle sprains by 38%

Week 1 - 2

- Week 1 - 2
- Eyes Closed

Week 3 - 5 + - Wobble Board

- Week 3 - 5 + - Wobble Board
- Week 4 - eyes closed
- Week 5 - closed, functional activities

Achilles

Mechanism
- Repetitive eccentric load on tendon
- Pushing off, running, sprinting, jumping
- Tender over achilles +/- swelling
- Pain with resisted plantarflexion/toe off
- Pain with passive ankle dorsiflexion
Arch type

Plantar Fascitis

- Tender on insertion on medial tubercle of calcaneus
- Associated with age, obesity, pes planus and pes cavus
- More prolonged, more difficult to manage
- Hx – symptoms typically worst in the AM and during heavy activity

Risk Factors

- Tight Achilles and plantar fascia
- Hyperpronation
- Marked forefoot varus
- Cavus foot – poor shock absorption, more stress on lateral achilles
- Advancing age - ↓ blood flow
- Overweight
- Male
- Poor footwear
- Systemic disease

Tendinosis

- Hyaline degeneration
- Mucoid degeneration
- Fibrillation of collagen
- Absence of inflammatory cells
- Requires around 100 days to synthesize collagen

Conservative treatment


Top 9 treatments (in order of effectiveness)
1. Short leg walking cast 5-6 wks (min. 3 wks)
2. Steroid injection
3. Rest
4. Ice
5. Change Shoes ie runner’s shoe
6. Crepe-soled shoe
7. NSAIDs, ASA
8. Heel cushion
9. Heel cup
Stretching, Physio +/- Tension Night Splint

Conservative Treatment

REDUCE STRESS
- Modified activities, Ice
- Calf / Achilles stretching
  - Hold each stretch for 30 seconds

Soleus stretch
Gastrocnemius stretch
### Treatment

- Heel lifts
- Modify footwear
- OTC or Custom orthotics
- Night splints
- PT is a major key

**Rarely**
- Surgical debridement

### Physical Therapy for Achilles


- RCT – eccentric exercises (3 x 15 reps, 2 times/day, 7 days a week x 12 wks)
- Results: Significant difference in pain levels
  - VAS 81.2 mm (+/- 18) to 4.8 mm (+/- 6.5) in 12 weeks
  - 81% eccentric satisfied vs 38% concentric satisfied

### Eccentric Drop program

### Achilles Tendon Rupture

**Symptoms**
- Sudden contraction with the foot dorsiflexed
- “Hit in back of leg” → Rupture
- Unable to raise on toes
- Over 20% missed on first visit

**Exam - Thompson test**
- Squeeze calf
- Foot should plantarflex

### Imaging (U/S or MRI)

**Diagnosis is usually Clinical**

### Treatment Controversy

**“To Cut or Not to Cut”**

**Conservative**
- Immobilization
- Early mobilization

**Surgical**
- Open operative repair
- Percutaneous repair
- Limited open repair
Achilles Tendon Rupture Tx
“To Cut or Not to Cut”

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>OPERATIVE REPAIR</th>
<th>NONOPERATIVE CASTING x 6-12 wks</th>
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</thead>
<tbody>
<tr>
<td>Rerupture</td>
<td>0.022</td>
<td>0.12</td>
</tr>
<tr>
<td>Major Complication</td>
<td>0.030</td>
<td>0.025</td>
</tr>
<tr>
<td>Moderate Complication</td>
<td>0.075</td>
<td>0.003</td>
</tr>
<tr>
<td>Minor Complication</td>
<td>0.111</td>
<td>0.005</td>
</tr>
<tr>
<td>Well</td>
<td>0.762</td>
<td>0.846</td>
</tr>
</tbody>
</table>


Posterior Tibialis (PT) Dysfunction

- Main dynamic stabilizer of the hindfoot to prevent Heel EVERSION
- Primary Invertor
- Hyperpronation
- Tendon dislocation or rupture (partial vs Complete tears) can cause flatfoot deformity

PT Dysfunction

Presentation
- Usually women > 40 y.o.
- Weakness with inversion
- “Too many toes sign”
- Unable to plantarflex – Single limb heel rise test

Management

Tendinopathy
- Physical therapy
- Orthotics +/- hindfoot brace (AFO)
- Consider period of immobilization 4-6 weeks
Surgical
- Early referral
- Tendon transfer vs arthrodesis

The Knee

- Hinge joint
- Function of ligaments, menisci, muscles
- Needs to be stable

Acute Hemarthrosis

1) ACL (almost 50% in children, >70% in adults)
2) Fracture (Patella, tibial plateau, Femoral supracondylar, Physeal)
3) Patellar dislocation
- Unlikely meniscal lesions
Emergencies

1. Neurovascular injury
2. Knee Dislocation
   - Associated with multiple ligament injuries (posterolateral)
   - High risk of popliteal artery injury
   - Needs arteriogram
3. Fractures (open, unstable)
4. Septic Arthritis

Urgent Orthopedic Referral

- Fracture
- Patellar Dislocation
- “Locked Joint” - unable to fully extend the knee (OCD or Meniscal tear)
- Tumor

Anterior Cruciate Ligament (ACL) Tear

Mechanism
- Landing from a jump, pivoting or decelerating suddenly
- Foot fixed, valgus stress

Symptoms
- Audible pop heard or felt
- Pain and tense swelling in minutes after injury
- Feels unstable (bones shifting or giving way)

ACL physical exam

LOOK
- Effusion (if acute)

FEEL
- “O’Donaghue’s Unhappy Triad” = Medial meniscus tear, MCL injury, ACL tear
- Lateral meniscus tears more common than medial
- Lateral joint line tender - femoral condyle bone bruise

MOVE
- Maybe limited due to effusion or other internal derangement

Special Tests ACL

- Lachman’s test – test at 20° (Sens 81.8%, Spec 96.8%)
- Anterior drawer – test at 90° (Sens 40.9%, Spec 95.2%)
- Pivot shift (Sens 81.8%, Spec 98.4%)

X-ray

- Usually non-diagnostic
- Can help rule in or out injuries
- Segond fracture – avulsion over lateral tibial plateau
### MRI
- Sens 94%, Spec 84% for ACL tear
- ACL tear signs
- Fibers not seen in continuity
- Edema on T2 films
- PCL – kinked or Question mark sign

### MRI
- Often has associated lateral bone bruise
- +/- meniscal tear (Lateral > medial)
- +/- MCL

### Initial Treatment
- Referral to Orthopaedics/Sports Medicine
- Consider bracing, crutches
- Begin early Physical Therapy
- Analgesia usually NSAIDs

### ACL Tear Treatment
- **Conservative**
  - No reconstruction
  - Physical therapy
    - Hamstring strengthening
    - Proprioceptive training
  - ACL bracing controversial
  - Patient should be asymptomatic with ADL's
- **Surgery**
  - Reconstruction
  - Depends on activity demands
    - Reconstruction allows better return to sports
    - Reduce chance of symptomatic meniscal tear
    - Less giving way symptoms
  - Recovery ~ 6 months

### Medial Collateral Ligament (MCL) Injury
- **Mechanism**
  - Valgus stress to partially flexed knee
  - Blow to lateral leg

- **Symptoms**
  - Pain medially
  - May feel unstable with valgus

### Medial Collateral Ligament (MCL) Injury
- **Physical Exam**
  - Tender medially over MCL (often proximally)
  - May lack ROM “pseudolocking”
  - Valgus stress test
MRI

- X-ray non-diagnostic (rarely avulsion)
- MRI not usually necessary
- Rule out meniscal tear

MCL Treatment

Conservative
- Analgesia
- Protected motion +/- hinged brace +/- crutches
- Early physical therapy

Surgery
- Rarely needs surgery

How do you tell MCL from meniscal tear?

Meniscus Tear

Mechanism
- Occurs after twisting injury or deep squat
- Patient may not recall specific injury

Symptoms
- Catching
- Medial or lateral knee pain
- Usually posterior aspects of joint line
- Swelling

Special Tests: Meniscus


<table>
<thead>
<tr>
<th>Test</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint line tender</td>
<td>85.5%</td>
<td>29.4%</td>
</tr>
<tr>
<td>Hyperflexion</td>
<td>50%</td>
<td>68.2%</td>
</tr>
<tr>
<td>Extension block</td>
<td>84.7%</td>
<td>43.75%</td>
</tr>
<tr>
<td>McMurray Classic (Med Thud)</td>
<td>28.75%</td>
<td>95.3%</td>
</tr>
<tr>
<td>McMurray Classic (Lat pain)</td>
<td>50%</td>
<td>29%</td>
</tr>
<tr>
<td>Appley (Comp/Dist)</td>
<td>16% / 5%</td>
<td></td>
</tr>
</tbody>
</table>

X-ray

- May show joint space narrowing and early osteoarthritis changes
- Rule out loose bodies
MRI
- MRI for specific exam
- Look for fluid (linear bright signal on T2) into the meniscus

Meniscal Tear Treatment
Conservative
- Often if degenerative tear in older patient
- Similar treatment to mild knee osteoarthritis
- Analgesia
- Physical therapy
  - General Leg Strengthening
Surgery
- Operate if internal derangement symptoms
- Meniscal repair if possible

Meniscectomy
- Partial meniscectomy preserves some function
- Partial meniscectomy of 15-34% of meniscus increases contact pressures about 350%
- Arthritis proportional to amount of meniscus removed
- 50% or greater reduction in contact area
- Increased load/area = degeneration
  - Fairbank changes: Narrowing Flattening Ridging

Posterior Cruciate Ligament (PCL) Injury
Mechanism
- Fall directly on knee with foot plantarflexed
  - “Dashboard injury”
Symptoms
- Pain with activities
- “Disability” > “Instability”

PCL Treatment
Conservative
- Acute: hinged post-op brace in extension (0-10° flexion)
- Crutches
- Early physical therapy
Surgery
- May require surgery if complete Grade 3 tear and symptomatic
- Needs urgent surgery if lateral side is unstable → posterolateral corner injury

Early and urgent referral!!
Patella

- Deviate patella to palpate lateral, medial and inferior facets
- Check patellar mobility
- Check tightness of the retinaculae/patellar tilt
- Apprehension test

Patellofemoral Pain

- Excessive compressive forces over articulating surfaces of PFP joint

Symptoms
- Anterior knee pain
- Worse with bending (5x body wt), stairs (3x body wt)
- Crepitus under kneecap
- May sublux if loose

Too Loose?

Hyperlaxity
- Associated with subluxation of the patellae
- Medial facet more commonly affected

Too Tight?

- Lateral hyperpression syndrome
- Tight hamstrings, iliotibial bands, high flexors and quadriceps

PFP Syndrome

- Tender over facets of patella
- Apprehension sign suggests possible instability
- X-rays may show lateral deviation or tilt

Treatment Options

Too Loose/Weak
- Strengthen quads (Vastus Medialis Obliquus), Hip abductors
- Correct alignment (+/-orthotics)
- Support (McConnell Taping, Bracing)

Too Tight
- Stretch hamstring, quadriceps, hip flexor
- Strengthen quads, hip abductors
- Correct alignment (+/-orthotics)

Surgical (RARE)
- Last resort
- Lateral release
- Patellar realignment
Iliotibial band friction syndrome

- 10-21% of running overuse injuries
- ITB crosses the lateral femoral epicondyle at 30°
- Associated with “varus” moment at the knee
- Hx – pain after running, biking, hiking after several minutes
- Painful walking downhill or down stairs
- May have painful click

ITB Syndrome

Fix the underlying problems

- ITB Stretching
- Hip abductor and medial quadriceps strengthening exercises
- Correct alignment
- Modify training

PE - Ober’s Test

Questions?

Knee
- Patellofemoral pain
- Overuse injuries
- Meniscus
- OA
- Ligament injuries

The Hips

- Ball (femoral head) and socket joint (acetabulum)
- Allows large degree of range of motion
- Transfers weight from leg to the pelvis
- Very stable

Hip Muscles

- Iliopsoas (hip flexors)
- Hamstring (hip extensors)
- Hip abductors
  - Gluteus Medius
- Adductors
- External rotators
- Internal rotators
Gluteal Tendinopathy
Cross country skiers, runners, ballet
External snapping
Chronic? Think Gluteal tendinopathy
Positive Ober’s test
PT - Treat with rest, stretch and anti-inflammatory

One-legged squat

Hip External Rotators

Hip Abductors

Treatment
Correct abnormal gain mechanics
Trochanteric bursa injection
Bursectomy?

Labral Function
Role of the labrum
1. Increases joint stability, improves hydrostatic fluid pressure in the intraarticular space
2. Increased joint stability, deepens socket
3. Load transmission
   • Isolated labral tears are uncommon
Femoral Acetabular Impingement (F.A.I.)
- Cam effect
- Protrusion of femoral head neck – “bump”
- Orientation of the acetabulum – acetabular version
- Increased stress on labrum

FAI: a possible cause of labral injury
Lavigne et al. 2004

Diagnosis – Presentation
- Clinically presents with painful hip flexion
- Internal popping
- Aggravated by the impingement sign (FAI)

Presentation
- Pain is classically in the anterior groin
- “C”-sign
- Less commonly in posterior hip

LOOK Standing:
Spinal alignment: posterior and lateral
Gait
Trendelenburg
Balance

FEEL - Palpation
- Anterior femoral triangle
- Gluteal muscles
- Greater trochanter
- ITB
- Piriformis
MOVE - ROM

- Logroll leg
- Patient supine or prone (Staheli method)
- Internal rotation is key

Hip Labral Tear

<table>
<thead>
<tr>
<th>Onset of symptoms</th>
<th></th>
<th>&lt;0.0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insidious</td>
<td>40 (81%)</td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td>20 (39%)</td>
<td></td>
</tr>
<tr>
<td>Trauma</td>
<td>5 (9%)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location of pain</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Groin</td>
<td>61 (92%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Anterior thigh/knee</td>
<td>34 (52%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Lateral hip</td>
<td>39 (59%)</td>
<td>0.14</td>
</tr>
<tr>
<td>Buttock</td>
<td>25 (38%)</td>
<td>0.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Associated symptoms</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity-related pain</td>
<td>68 (91%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Night pain</td>
<td>47 (71%)</td>
<td>0.0006</td>
</tr>
<tr>
<td>Mechanical snapping/ popping/locking</td>
<td>35 (53%)</td>
<td>0.082</td>
</tr>
</tbody>
</table>

Burrett SJ et al., JBJS-A, 2006

MR Arthrogram

Enhanced sensitivity 90%
Slightly higher false positive 20%
Offers advantage of diagnostic injection of anaesthetic

Anterior Hip Pain Intra-articular FAI

Cam procedure
- Labral repair or debridement
- Microfracture
- Chondroplasty

Complications: adhesions, fractures and AVN

Anterior Hip Pain Intra-articular FAI

Pincer procedure
- Acetabular resection
- Labral reattachment

Hip OA

Often anterior but may mimic SI pain
PE: loss of motion, particularly internal rotation
Therapy: NSAIDS, activity modification, non impact PT
Chondroplasty for chondral lesions < 4cm
Arthroplasty
Stress fracture risk factors

- Gait Mechanics
- Bone Loading
- Training
- Bone Health
- Impact

Stress Injury $\leftrightarrow$ Stress Fracture


Diagnosis

**History**
- Pain with loading/stressing bone (i.e. running, jumping, etc.)
- May have history of new activity or increased training

**Physical exam**
- Localized bone tenderness +/- swelling
- Antalgic gait
- Unable to hop

Femoral Neck Stress fracture

- MRI 100% sensitive (gold standard)
  Shin et al. AJSM, 1996
- Crutches with non-weightbearing x 2-4 weeks; then protected weightbearing x 6-8 weeks

**AVN**

- Age 40-50
- Painful Weight bearing
- Multiple risk factors
  - Trauma
  - Steroid use
  - Alcohol
  - SLE
  - Metabolic ie Gaucher’s
  - Sickle cell anemia

Plain films may be normal
MRI is most sensitive

Iliopsoas Tendinopathy

May present with a snapping hip and/or pain
Classic physical findings includes pain going from flexion to extension
P/E Iliopsoas

- Low pitched snap on flexion to extension of hip (Thomas test)
- Tender on deep palpation of anterior groin
- Sore with hyperflexion of hip

Treatment

PT
Treat with stretches
Core stability

Consider steroid injection (under fluoroscopy or ultrasound)
Iliopsoas tendon lengthening

Shoulder Anatomy

4 joints:
1) sternoclavicular
2) acromioclavicular
3) Glenohumeral joint: ball and socket joint
4) scapulothoracic

Glenoid covers only 25% of humerus

Shoulder – Static Stabilizers

- Ligament > Bony stability
- Glenohumeral ligaments
  - superior, coracohumeral, middle, and inferior
- Joint capsule
- Glenoid labrum
  - anterior - posterior support

Shoulder – Dynamic Stabilizers

STABILIZERS
- Rotator cuff:
  Supraspinatus, Infraspinatus, Teres Minor and Subscapularis
- Need balanced Force couples

MOVERS
- Deltoid, Teres major, Long head of biceps, Pec Major, Pec Minor

Scapular – Dynamic Stabilizers

- Levator scapulae
- Trapezius muscle
- Serratus anterior
- Rhomboids
- Latissimus dorsi
- Pectoralis minor
Shoulder Impingement Syndrome

**Mechanism**
- Impingement under acromion with flexion and internal rotation of the shoulder
- Rotator cuff, subacromial bursa and biceps tendon

**Symptoms**
- Pain with
  - Overhead activities
  - Sleep (internal rotation)
  - Putting on a jacket

Shoulder Pain Differential Diagnosis

- Rotator cuff tendinopathy
- Rotator cuff tears
- SLAP Lesion
- Calcific tendinopathy
- “Frozen” shoulder (adhesive capsulitis)
- Acromioclavicular joint problems
- Scapular weakness
- Cervical radiculopathy

Shoulder Impingement Syndrome

**LOOK**
- May have posterior shoulder atrophy if chronic or RC tear
- Poor posture

**FEEL**
- Tender over anterolateral shoulder structures

**MOVE**
- May lack full active ROM

Shoulder Impingement Syndrome

**Rotator Cuff strength testing**
- Supraspinatus - Empty can/ Full can
- Infraspinatus/teres minor - External rotation
- Subscapularis – Internal rotation / Lift-off test

**Impingement Signs**
- Neer
- Hawkin’s
- Spurling’s test for cervical radiculopathy

**X-ray AP Scapula**
- Avulsion
- Calcific tendinosis
- Enthesopathy (traction spurs)
- Alignment
X-ray AC Joint view

• Osteoarthritis
• Osteolysis

X-ray Lateral Scapula

• Mercedes sign – humeral head should be centered in glenoid
• Can check for “hooked” acromion

Normal
Large acromial spur

X-ray Lateral Scapula

X-ray Axillary View

• Position
• Posterior dislocation

Ultrasound

• Dynamic test
• Operator dependent
• Areas of tendinosis hypoechoic
• Tears

MRI

• MRI not needed for conservative treatment
• Use it to rule out significant pathology
How good for full thickness tears?
• 69 to 100 percent sensitive
• 88 to 100 percent specific
### Rotator Cuff Tears

#### SIS Treatment

**Conservative**
- Education
- Modify Activities
- Alter Biomechanics / Decrease tendon load
- Ice/NSAIDs (no evidence)
- Eccentric exercise programs
- Steroid injection
  - slightly better than placebo
  -(Cochrane Database, 2004)

**Surgery**
- If patient fails conservative treatment for > 6-12 months
- If rotator cuff tear > 1 cm
  - Subacromial decompression
  - +/- bursectomy
  - +/- rotator cuff repair

### Adhesive Capsulitis / Frozen Shoulder

**Mechanism**
- Unknown? autoimmune
- May have history of diabetes, hypothyroidism, rheumatoid arthritis

**Symptoms**
- Usually follows an injury or period of immobilization
- Stiff
- Pain with extremes of ROM

### Diagnosis

**Physical Exam**
- Limited range of motion → usually lose:
  - Internal rotation, external rotation, abduction and flexion

**Investigations**
- X-ray, Ultrasound, MRI usually non-diagnostic

### Adhesive Capsulitis Treatment

**Conservative**
- Education and reassurance
- May take 24 months to unthaw
- Physical therapy
- Glenohumeral injection +/- capsular distension

**Surgery**
- Exam and manipulation under anesthesia
- Arthroscopic release
Shoulder Dislocation

Mechanism
Anterior (>95%)
• Force applied with shoulder in external rotation/ abduction

Posterior (<5%)
• Posterior force with shoulder in internal rotation/ adduction
• EtOH (alcohol), Electrocution, Epilepsy

Shoulder “Dislocation”

History
• Fall on outstretched hand
• Hit with arm in abduction
• Shoulder “came out”
• Reduced spontaneously or in the ER

Symptoms
• “Dead arm” (due to traction on brachial plexus)
• Pain anteriorly
• Limited motion

Diagnosis

Physical Exam
• Tender anterior shoulder
• May have decreased sensation to army patch (axillary nerve)
• Apprehension test
• Sulcus sign (MDI)

X-ray and MRI

Hill Sachs Lesion – compression fracture of posterior humerus
Bankart Lesion – Avulsion of capsular attachment to the glenoid

Complications after Dislocation

Acute rotator cuff tear
• 40 to 60% incidence of in patients > 40 years old
Frozen shoulder
• Older the patient the stiffer they get
  →mobilize early within 2-3 weeks
Recurrent dislocation
• >90% recurrence < 20 years; 14% > 40 yrs
• Early surgical stabilization still controversial
Initial Treatment

• Sling x 2-4 weeks with pendulum exercises
• Early physical therapy
• Modification of activities

Treatment for Shoulder Instability

• T – Traumatic
• U – Unilateral
• B – Bankart lesion
• S – Surgical treatment (refer for consultation)
• A – Atraumatic
• M – Multidirectional
• B – Bilateral
• R – Rehabilitation
• I – Inferior capsular shift

History

• Catching, clunking in the shoulder
• Pain with throwing
• May have “subluxation” of shoulder

O’Brien Test

Palm Up
Palm Down

Adduct 150°

MR Arthrogram

Surgical indications

• Failure of conservative treatment
• Persistent mechanical symptoms
**Acromioclavicular Joint “Separation”**

**Mechanism**
- Direct fall on the shoulder
- Common biking, contact sports (hockey, football etc.)
- May tear #1 acromioclavicular ligament; #2 coracoclavicular ligament

**Symptoms**
- Pain directly over AC joint
- Difficulty lifting weights
- Difficulty reaching overhead and across body

**Investigations**

- AC joint views
- Weighted views rarely ordered

**Diagnosis**

**Physical Exam**
- Swelling, tenderness +/- step deformity over AC joint
- Early limited motion actively due to pain
- Cross over sign +

**Classifying AC Separations**

<table>
<thead>
<tr>
<th>Type</th>
<th>Ligaments affected</th>
<th>Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acromioclavicular (AC) lig strain;</td>
<td>Tender over AC joint, no step</td>
</tr>
<tr>
<td></td>
<td>Coracoclavicular (CC) lig OK</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>AC lig torn</td>
<td>Mild step &lt; width of clavicle</td>
</tr>
<tr>
<td></td>
<td>CC lig partially torn</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>AC and CC ligs torn</td>
<td>Obvious step =&gt; width of clavicle</td>
</tr>
</tbody>
</table>

**Treatment**

**Conservative**
- Sling as good as figure eight
- Physiotherapy – taping, restore ROM, maintain strength
- Modify activities

**Return to Sports**

- Grade 1 – as symptoms allow, typically up to 2 weeks
- Grade 2 – typically 4 to 6 weeks
- Grade 3 – up to 12 weeks
Refer to Surgery
- Type 4 – Posterior dislocation
- Type 5 – High riding distal clavicle (tenting the skin)
- Type 6 – Posterior-inferior dislocation

Can the Athlete Play Safely?
- Make a working diagnosis
- Is there potential for worsening injury? A new secondary injury?
- MD or trainer decides: CAN THE ATHLETE PLAY SAFELY?
- Coach and MD decide: Can the athlete play effectively?
- Player, coach and MD decide: Can the athlete play pain free?

Practical tips
- Think conservative and surgical options
- If problem with LOOK, FEEL, MOVE, consider investigations or active treatment
- If one of the differential diagnosis is bad, REFER
- If you don’t have a working diagnosis or plan, REFER
- If your family member has the same symptoms, what would you do?