Treatment of Common Orthopaedic and Sports Injuries

Part 1 and 2

Anthony Luke
MD, MPH, CAQ (Sport Med)
Primary Care Medicine: Concepts and Controversies 2009

Overview

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

History is Key

Who?
- Numbness
- Fever

What?
- Acute vs Chronic (2 weeks? 6 weeks?)
- Think anatomy
- One finger test

When?
- Where?
- 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

Intrinsic Risk Factors

- Growth
- Anatomy
- Muscle/Tendon imbalance
- Illness
- Nutrition
- Conditioning
- Psychology

Extrinsic Risk Factors

- Training
- Technique
- Footwear
- Surface
- Occupation
- TO PREVENT INJURIES!!

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

Why?

Shock Absorption

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

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

Why?

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)

FEEL – Palpate important structures

MOVE – Assess Range of Motion

SPECIAL TESTS
Provocative tests
• Reproduce patient’s pain

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

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
Tibia and Fibula
- Lower leg
- Separated by a syndesmosis
- Lower end forms ankle mortise
- Tibia bears majority of weight

Biomechanics of the Foot and Ankle
- Plantarflexors propel body forward
- “Toe Off” involves the 1st MTP joint
- “Double float”

Windlass Mechanism

Anatomy of the Foot
- Hindfoot
- Chopart’s Joint
- Midfoot
- Lisfranc’s Joint
- Forefoot
Arch type

Ankle Movements

• 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.

Ankle Ligaments

Medial Ligament Complex
• Deltoid ligament
• Superficial and deep ligaments
Ankle Ligaments

Subtalar joint
- Interosseous talocalcaneal ligament

Tibiofibular joint
- Anterior and posterior tibiofibular ligaments, intraosseous membrane

Muscles

Posteromedial
- “Tom, Dick And Not Harry”
- Posterior Tibialis, Flexor Digitorum, Tibial Artery, Tibial Nerve, Flexor Hallucis Longus

Lateral
- Peroneus Longus, Brevis, Tertius

Superior
- Anterior tibialis, extensors

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
- Swelling/bruising laterally

FEEL
- Point of maximal tenderness usually ATF

MOVE
- Limited motion due to swelling

Special Tests Anterior Drawer Test

- Normal ~ 3 mm
- Foot in neutral position
- Fix tibia
- Draw calcaneus forward

Subtalar Tilt Test

- Foot in neutral position
- Fix tibia
- Draw calcaneus forward

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)

Which X-rays?

AP mortise

15 - 30° IR foot

• Joint space symmetric (2-3 mm)

• Tibiofibular overlap (at least 1 mm)

Which X-rays?

• 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)

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

“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

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).

Handa 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 2 - Eyes Closed

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

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

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

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
Tendinosis

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

Conservative Treatment

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

Gastrocnemius stretch

Soleus stretch

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

Stretches, Physio
+/- Tension Night Splint

Treatment

- Heel lifts
- Modify footwear
- 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

Assal et al., JBJS, 2002, 84-A:2.

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>
</tr>
</thead>
<tbody>
<tr>
<td>Rerupture</td>
<td>0.022</td>
<td>0.121</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 Inverter
- 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

Questions?

Ankle
- Sprains #1
- Tendinopathies
- Fractures

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

Knee Ligaments

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

- Sens 94%, Spec 84% for ACL tear
- ACL tear signs
- Lateral femoral corner bone bruise on T2
- May have meniscal tear (Lateral > medial)

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
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

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

Posterior Cruciate Ligament (PCL) Injury
Mechanism
- Fall directly on knee with foot plantarflexed
- “Dashboard injury”

Symptoms
- Pain with activities
- “Disability” > “Instability”

Posterior Cruciate Ligament (PCL) Injury
Physical Exam
- Sag sign
- Posterior drawer test
- X-ray- often non-diagnostic

MRI is test of choice
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 hyperpressure 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)
- Correct alignment (+/-orthotics)
- Support (McConnell Taping, Bracing)

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

Surgical
- 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
PE - Ober's Test

Questions?

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

ITB Syndrome

Fix the underlying problems

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

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
- Adductors
- External rotators
- Internal rotators

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

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

Trochanteric Bursitis

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

- Trochanteric bursa injection
- Correct abnormal gain mechanics
- Bursectomy?

Hip Scope – Hot Topic

- Hip scopes is the new frontier in sports medicine
- Statistics hip scopes performed
- 75,000 in 2007, 30,000 in 2003

Natural history of labral tear?

- 93% had at least one labral lesion (average age 78 range 48-102)
Femoral Acetabular Impingement (F.A.I.)

- Cam effect
- Protrusion of femoral head neck – “bump”
- Orientation of the acetabulum – acetabular version
- Increased stress on labrum

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

FAI: a possible cause of labral injury
Lavigne et al. 2004
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 (61%)</td>
<td>&lt;0.0001(^*)</td>
</tr>
<tr>
<td>Acute</td>
<td>20 (30%)</td>
<td>0.81</td>
</tr>
<tr>
<td>Trauma</td>
<td>6 (9%)</td>
<td>0.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location of pain</th>
<th></th>
<th>&lt;0.0001(^*)</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>0.14</td>
</tr>
<tr>
<td>Lateral hip</td>
<td>39 (59%)</td>
<td>0.05</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>&lt;0.0001(^*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity-related pain</td>
<td>60 (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>39 (59%)</td>
<td>0.062</td>
</tr>
</tbody>
</table>

Burnett 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
Osteoplasty

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
AVN

Anterior Hip Pain
Intra-articular

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

AVN

Anterior Hip Pain
Intra-articular

Plain films may be normal
MRI is most sensitive

What are the risk factors?

S t r e s s e d F r a c t u r e s

Stress Injury ↔ 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

X-ray
• Periosteal thickening (takes > 2 weeks to appear)
• Fracture line

Bone Scan

MRI

Traction vs. Compression Stress Fractures

• Tibia —medial, anterior*
• Foot – metatarsal shafts or base of 5th metatarsal (metaphysis – Jones fracture*)
• Spine – Spondylolysis L5 pars interarticularis*
• Pelvis – pubic rami, ischial tuberosity
• Femoral neck*
• *- denotes high risk of non-union

Tibial Stress Fractures

• Activity modifications (painfree)
• Pneumatic brace
• May take up to 12-16 weeks to recover

• Anterior “dreaded black line” stress fracture
• Unload bone
• May require surgery if no healing in 8-12 weeks
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

Avulsion of the Base of the 5th Metatarsal

- Due to pull of peroneus brevis
- Most common foot fracture (90%)

Treatment
- May treat conservatively as a sprain
- Usually heals in around 6-12 weeks

Jones Fracture

- May go on to non-union
- Treat with immobilization for 8-12 weeks
- May require ORIF

Female Athlete Triad

Pathophysiology
- Disordered eating, loss of periods (amenorrhea), and thin bones (osteoporosis)
- Caloric imbalance
- XS output (too much training) vs insufficient input (disordered eating)
Female Athlete Triad

Symptoms
- Often presents with recurrent stress fractures
- Irregular periods or delayed menarche
- Vegetarian at young age
- Avoids eating with others or skips meals
- Trains excessively
- Using dieting methods inappropriately

TEAM approach
- Psychologist / psychiatrist
- Nutritionist
- Family
- Coach
- Sports Physician
- Family Physician
- OB/GYN

Questions

Hip
- Overuse tendinopathies
- OA
- Labral tears
- Stress fractures

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 Maior, 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

Shoulder Impingement Syndrome

Rotator Cuff strength testing
- Supraspinatus - Empty can/ Full can
- Infraspinatus/teres minor - External rotation
Shoulder Impingement Syndrome

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

Impingement Signs

- Neer
- Hawkin’s
- Spurling’s test for cervical radiculopathy

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

**X-ray Lateral Scapula**
- Normal
- Large acromial spur
**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”

- Women greater than men (70%)
- Age > 40 years
- Affects 2-5% of population
- 20-30% develop symptoms in opposite shoulder

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

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

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), Electrocreation, 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

Shoulder “Dislocation”
Diagnosis

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

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

X-ray and MRI

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

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 Down

Adduct 10°

Palm Up

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

Diagnosis

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

Investigations

- AC joint views
- Weighted views rarely ordered
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?

You Can Do It!!