Common Orthopaedic and Sports Medicine Problems

Crash Course

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Disclosures

• Founder, RunSafe™
• Founder, SportZPeak Inc.
• Sanofi, Investigator initiated grant
Overview

• Quick approach to MSK problems (in syllabus)
• Highlight common presentations
• Joint by joint
• Discuss basics of conservative and surgical management
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
- Tests ATF ligament

Sens = 80%
Spec = 74%
PPV = 91%
NPV = 52%

Subtalar Tilt Test

- Foot in neutral position
- Fix tibia
- Invert or tilt calcaneus
- Tests Calcaneofibular ligament

No Sens / Spec Data
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%
Treatment of Ankle Sprains

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

Physical Therapy
• ROM
• Strengthening
• Stretching
• 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

No Sens/ Spec Data
Kappa = 0.75

Squeeze test

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

No Sens/ Spec Data
Kappa = 0.50

Treatment for Syndesmotic Injury

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

Surgery
• May need ORIF if unstable

Maisonneuve Fracture
Ankle Sprain Prevention

• Ankle braces, tape and proprioceptive training help reduce the risk of lateral ankle sprains

• 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
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
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
Anterior Cruciate Ligament (ACL) Tear

Symptoms

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

- “O’Donaghe’s Unhappy Triad” = Medial meniscus tear, MCL injury, ACL tear
- Lateral meniscus tears more common than medial

Double fist sign
ACL physical exam

LOOK
• Effusion (if acute)

FEEL
• “O’Donaghe’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 22 - 41%, Spec 97%*

• Pivot shift
  Sens 35 - 98.4%*, Spec 98%*

Malanga GA, Nadler SF. Musculoskeletal Physical Examination, Mosby, 2006

* - denotes under anesthesia
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 ~ 6-9 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
Modified McMurray Testing

• Flex hip to 90 degrees
• Flex knee
• Internally or externally rotate lower leg with rotation of knee
• Fully flex the knee with rotations

Courtesy of Keegan Duchicella MD
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
Arthroscopy Benefit?

- An RCT showed that physical therapy vs arthroscopic partial meniscectomy had similar outcomes at 6 months.
- 30% of the patients who were assigned to physical therapy alone, underwent surgery within 6 months.
  
Exercise as Good as Arthroscopy?

- RCT found that patients with degenerative meniscus tears but no signs of arthritis on imaging treated conservatively with supervised exercise therapy had similar outcomes to those treated with arthroscopy with 2 year follow up.

Kise NJ et al., BMJ, 2016
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
Patellofemoral Pain

Mechanism
- Excessive compressive forces over articulating surfaces of PFP joint
- Too loose/hypermobile
- Too tight – XS pressure

Symptoms
- Anterior knee pain
- Worse with bending (5x body wt), stairs (3x body wt)
- Crepitus under kneecap
- May sublux if loose
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 (RARE)
• Last resort
• Lateral release
• Patellar realignment
What’s Hip?
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

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
MOVE

Painful Arc 60 - 120°

Flexion and External rotation
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

• Passive full flexion
• Positive is reproduction of shoulder pain

Sens = 83 %
Spec = 51 %
PPV = 40 %
NPV = 89 %

Impingement Signs

Hawkin’s test
• Flex shoulder to 90°
• Flex elbow to 90°
• Internally rotate
• Positive - reproduce shoulder pain

Sens = 88 %
Spec = 43 %
PPV = 38 %
NPV = 90 %

Impingement Signs

• Spurling’s test for cervical radiculopathy

Sens = 64%
Spec = 95%
PPV = 58%
NPV = 96%
X-ray AP Scapula

- Avulsion
- Calcific tendinosis
- Enthesopathy (traction spurs)
- Alignment
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
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
Frozen Shoulder

- Gradual loss of range of motion
- May have had initial trauma
- Pain at the extremes of motion
- May have history of diabetes, hypothyroidism, rheumatoid arthritis, now Breast Cancer Tx
Diagnosis

• Limited range of motion (usually lose external rotation, abduction and flexion)

• Investigations (X-ray, Ultrasound) usually negative
Natural History

• 0-3 months “gradual onset” - painful
• 2-9 months “freezing”
• 4-12 months “frozen”
• 5-26 months “thawing”

• Usually self-limited

Steroid injection

• RCT showed intraarticular steroid injection provided better pain relief in the first 8 weeks than NSAIDs.
• However, no difference was seen in range of motion or pain after 12 weeks.
• Results similar to other non-controlled studies

Treatment

• Pain management (+/- sling)
• Education and reassurance
• Active home stretching program

• Physiotherapy
• Oral NSAIDs (or steroids)
• Glenohumeral injection capsular distension
• Rarely needs surgery (examination under anesthesia or Arthroscopic release)
Shoulder Dislocation

Mechanism
Anterior (>95%)
- Force applied with shoulder in external rotation/abduction
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
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
# Causes of Back Pain


<table>
<thead>
<tr>
<th>Lesion</th>
<th>Youth</th>
<th>Adult</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discogenic</td>
<td>11</td>
<td>48</td>
<td>0.05</td>
</tr>
<tr>
<td>Spondylolytic lesion</td>
<td>47</td>
<td>5</td>
<td>0.05</td>
</tr>
<tr>
<td>Lumbosacral strain</td>
<td>6</td>
<td>27</td>
<td>0.05</td>
</tr>
<tr>
<td>Hyperlordotic mechanical back pain</td>
<td>26</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>0</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
Disk Herniation

Mechanism
• L5-S1 most common 90%
• Compression of neural structures such as sciatic nerve causes radicular pain
• Compression of cauda equina = EMERGENCY

Symptoms
• Acute herniation usually 30-50 years
• Pain worse with flexion
• May have “Sciatica” – Pain with sitting too long (i.e. driving)
• Rule out bowel or bladder symptoms
Treatment

• Education, ergonomics
• Activity modifications
• Physical Therapy
• Medications
  – NSAIDs should be recommended (Strength: Strong)
  – Opioids may be considered but should be avoided if possible (Strength: Weak)
  – Antidepressants should not be routinely used (Strength: Strong)

White et al. Spine, 2011
**Treatment**  Mean differences Reported

- **Medications**
  - Corticosteroids pooled results of two trials (overall and leg pain -12.2, 95% C.I. -20.9 to -3.4)
  - Single trial of gabapentin (pain -26.6, -38.3 to -14.9) but only short term benefits
    
    Pinto et al. BMJ, 2012
  
  - Epidural corticosteroid injections vs placebo for leg pain (mean difference, -6.2 [95% CI, -9.4 to -3.0]) and also for disability (-3.1 [CI, -5.0 to -1.2]) in the short term

Surgery better than Non-operative (SPORT) – Disk (SE: A)

• In patients with a herniated disk confirmed by imaging and leg symptoms persisting for at least six weeks, surgery was superior to non-operative treatment in relieving symptoms (15.0 (95% C.I.’s, 11.8 - 18.1)) and improving function (14.9 (95% C.I.’s, 12.0 - 17.8))

• 4-year rate of reoperation was 10%

Surgical Treatment

• Cauda equina needs emergency decompression

Surgical Indications
• Sufficient morbidity
• Failure of conservative treatment
• Anatomic lesion that can be corrected
• Complications usually neurologic
Concussion Update
Concussion Definition

- Type of mild traumatic, transient brain injury
- Blow to head, neck, body $\rightarrow$ force to head.
- Neurologic impairment within 48 hours of trauma.
- Symptoms usually resolve in 1-2 weeks spontaneously but in some cases can be prolonged.
- May or may not include loss of consciousness.

Concussion Symptoms

Physical Examination

• Use the SCAT3 card (free on the web)
  • Orientation
  • Concentration (numbers backwards)
  • Short and long term memory

• Clear C-spine

• Rule out soft tissue and bony injury to head

• Balance Error Scoring System
Concussion evaluation: physical exam

- Normal neck exam
- Normal neurologic exam
Concussion Treatment

- Cognitive rest
- Physical rest
- Medication
  - Tylenol
  - Ibuprofen after first 72 hours
- No driving
- No Etoh
Diagnostic Imaging

Neuroimaging (CT, MRI)

- Most patients do not require imaging
- Use when suspicion of intracerebral structural lesion exists:
  - prolonged loss of consciousness
  - focal neurologic deficit
  - worsening symptoms
  - Deterioration in conscious state
Symptom resolution after sport concussion

- 50% recovered and returned to play in 1 week; 90% in 3 weeks (Collins et al. Neurosurgery, 2006.)
- High schoolers take longer to recover based on neuropsychological testing compared to college athletes (Field et al, J Pediatr, 2003.)
Return to Learn Progression

No school.
OK to do light reading, little bit TV, drawing, cooking as long as doesn’t worsen symptoms.

15 min cognitive activity at a time.

30 min schoolwork at a time until can do 1-2 hours.

Return to ½ day of school.

Return to full day of school.

http://www.chop.edu/service/concussion-care-for-kids/returning-to-school.html
Return to Play Progression

Asymptomatic

Light aerobic activity

Tuesday

Sport specific activity

Wednesday

Non-contact training

Thursday

Clinician clearance

Friday

Full contact practice

Saturday

Game play

Management

• All student athletes need to have an MD or qualified health professional to clear to play

• School-aged athletes will be out at least 1 week most likely 2 (check your area for legal requirements)
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?
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What's New in Version 1.1.1
– Several Bug Fixes

Screenshots

Spine
Spurling's Neck Compression Test

Tutorials

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