Orthopedic Injuries

• Objectives
  – Review Orthopedic History & Physical
  – Review Radiology Basics
  – Review Diagnostic Evaluation Criteria
  – Review Management of Sprains, Strains, Fractures, Dislocations
  – Discuss Orthopedic Injury Cases
    • Fractures, Dislocations, Soft tissue injuries.
Evaluation of Injuries (HOPS)

- **HISTORY (OPQRST)**
  - Mechanism of injury?
  - Location?
  - Onset/Duration?
  - Provocative/Palliative?
  - Quality?
  - Rating/Severity?
  - Timing?
  - Previous injury?
  - Numbness, tingling, coolness, weakness?
  - PMH, PSH
  - Allergies?
  - When did you eat last?
Evaluation of Injuries (HOPS)

• Observation/Inspection
  – Obvious deformities
  – Skin integrity
  – Boney prominences
  – Mal-alignments
  – Rotational deformities
  – Leg length discrepancies

• Palpation (Physical Evaluation)
  – Everywhere
  – Start away from injury

• Gentle AROM/PROM
• Strength testing when indicated
• Special tests when indicated
Radiology Basics

- Xray: Initial test of choice
  - Order AP/Lateral, other view available depending on injury.
  - **Xray joint above/below injury for more severe injuries**
  - **Weight bearing views for some injuries can be helpful**
- "DOH": Dislocations, Occult fractures, Half injuries missed
- MRI: Superior for soft tissue injury, occult fractures, stress fractures, infections, tumors, spinal cord pathology. Add contrast for infections, tumor, post op.
  - MRI Arthrogram-contrast injected in joint-for more detailed evaluation-Hips/Shoudlers
- CT: Superior for bone and fracture evaluation.
- Bonescan: Malignancy, osteomyelitis, occult fractures, stress fractures, implant loosening/infection.
- Angiography: Joint dislocations, upper/lower extremity injuries with possible vascular injury.
Strains and Sprains

• Strain-(Tendon) An injury that occurs to the bone-tendon-muscle complex at the myotendinous junction or muscle itself when tissue is stretched or torn beyond normal capacity.

• Sprain- An injury that occurs to collagenous tissue, such as ligaments when the tissue is stretched or torn beyond normal capacity.
Strains and Sprains

• Mechanism of injury often follows a sudden stretch.
  – Can lead to avulsion injury to tendon, ligament, and/or bone.
  – Example: ATF Ankle Sprain, Mallet Finger.

• Classification of Sprains
  – Grade 1: Mild stretching without tearing of fibers. Mild instability, <5mm motion
  – Grade 2: Moderate stretching with some tearing. Mild to moderate instability, >5mm motion
  – Grade 3: Severe stretching with rupture of ligaments. Severe instability.
Strains and Sprains

• Treatment: Supportive treatment (RICE)
  – RICE-Rest, Ice/Immobolization, Compression, Elevation, Anti-Inflammatories
  – Splints/Casts, Bracing, Immobilizers.

• Surgery- Avulsion injuries/fractures that fail conservative tx, Grade 3 Sprains.
Fracture Management

• Initially treated with analgesics, +/- reduction, immobilization, ice/elevation, weight-bearing, activity modification, and referral to Orthopedics after patient is stabilized.

• Any bleeding is an open fracture until proven otherwise.
  – IV ABX (1\textsuperscript{st} gen cephalosporins and aminoglycosides) x 48hrs after fracture and 48hrs after surgery. PO ABX?
  – Open fractures should be irrigated/debrided within 4-8hrs of injury.

• Non-displaced closed fractures-
  – Immobilize with splint, cast after swelling subsides.
  – Immobilizers, Walker Boots, Braces.
  – Referral to Orthopaedic Surgeon

• Displaced fractures- Open Reduction Internal Fixation (ORIF)
Dislocation Management

• Dislocation: Complete dissociation of a joint.
• Subluxation: Partial dissociation of a joint.

• Treatment:
  – First assess neurovascular status and document
  – Then perform closed reduction
  – Open reduction:
    • Failed closed reduction, interposed soft tissue preventing reduction, associated fracture.
    – Apply immobilization (splint, sling) ~2-4 weeks, followed by ROM and return to normal activity.
• Always perform post-reduction Neurovascular exam, Xrays, and document.
Hand and Wrist Injuries

• Bones
  – Carpals
    • 2 rows
      – Distal-Trapezium, trapezoid, capitate, hamate
      – Proximal- Scaphoid, lunate, triquetral, pisiform
  – Metacarpals
  – Phalanges
  – Radius
  – Ulna

• Joints

• Ligaments

• Muscles
Bones most often injured

- Radius
- Ulna
- Lunate (dislocation)
- Scaphoid (fracture in anatomical snuffbox)
- Metacarpals
- Phalanges
Colle’s Fracture
Involves the distal end of radius
Deformity-dependent on severity of fracture displacement

• Subsequent Injuries
  – Can also have Ulnar Styloid fractures
Mechanism of Injury

• Fall on an outstretched hand
• Run into wall, etc, with wrist hyperextended
Signs and Symptoms

- Visible deformity-dependent on severity of injury
- Swelling
- Pain
- Point tender in the area of fracture
- Limited ROM of the wrist due to pain
Evaluation and Treatment

• Xrays-AP/Lat/Oblique views
• Splint/Immobolize in position you find it
• Ice
• Pain meds/NSAIDS
• ER/Orthopaedic referral
  – Reduction and Cast stabilization
  – ORIF
Wrist Sprain

• MOA: Mechanism of Action
  – Abnormal forced movement of the wrist
  – Falling on hyperextended or hyperflexed wrist
  – Violent torsion
Signs and Symptoms

• Pain
• Point tenderness
• Swelling
• Difficulty moving wrist—limited ROM due to pain
• Some patients can have instability
Evaluation and Treatment

- Xrays-AP/Lat/Oblique views-r/o fracture if concerned
- RICE for mild/moderate
- Splint/Immobolize if necessary depend on severity
- Exercises for strengthening and ROM
- NSAIDS
- Physical Therapy
- Orthopaedic referral for more severe injuries
  - When to refer-has not improved in 5-7 days with appropriate treatment
Wrist Tendonitis

• MOI-Mechanism of Injury
  – Repetitive motion at wrist—usually in flexion/extension
  – Seen more often in athletes involved in sports with repetitive acceleration and deceleration
    • i.e. weight lifters, rowers
Signs and Symptoms

• Pain with active motion
• Pain with passive stretching
• Point tendernessness over either flexor or extensor tendons
• Swelling
Treatment

- Ice
- Heat
- Analgesics
- Modify activity
- NSAIDS
- Splint/Immobilization
- Physical therapy
  - Strengthening and ROM exercises
Hand injuries

• Dislocation of lunate
• Scaphoid Fracture
• Hamate Fracture
• Metacarpal Fracture—Boxer’s fracture
Dislocation of Lunate

- MOI: Forced hyperextension of wrist

- Signs and Symptoms
  - Pain
  - Swelling
  - Difficulty moving wrist and fingers into flexion
  - Numbness/paralysis of flexors due to pressure of lunate on median nerve
  - Deformity
Lunate Dislocation
Lunate dislocation
Treatment

- Need for immediate reduction
- Splint
- ER/Orthopaedic referral for reduction
- Surgical Intervention if closed reduction not possible
Scaphoid Fracture

• MOI:
  – Fall on hyperextended wrist
  – Force on outstretched hand (hyperextended wrist) that compresses the bone between the radius and 2nd row of carpal bones
Signs and Symptoms

• Pain and Point tenderness over the anatomical snuffbox
• Swelling
• Possible discoloration
• Limited ROM of wrist due to fracture and pain
• Evaluation:
  – Xrays-AP/Lateral/Scpahoid View/Clinched fist
Scaphoid fracture
Scaphoid fracture
Treatment

- RICE
- Splint/Immobilize
- Ortho Hand Referral
- Treatment based off of fracture characteristics
  - Non-displaced can be treated conservatively with thumb spica cast/splint
- If not recognized as fracture, could have non-union then surgery is required
- MRI-May be needed to assess for fracture location/characteristics and blood flow
Hamate Fracture

• MOI
• Fall on hand
• Contact to palm of hand with sports implement
  – Swinging baseball bat
  – Swinging tennis racquet
  – Swinging golf club
Hamate fracture
Signs and Symptoms

• Wrist pain
• Weakness in wrist motion
• Point tenderness over hook of hamate
• Possible tingling, numbness due to compromise of ulnar nerve
Treatment

• RICE
• Splint
• Physician referral
• Cast
• May need surgery to resect fracture if not healing, continued pain, or neurological symptoms
Metacarpal (Boxer’s) Fracture

• Most common of all metacarpal fractures
• Associated with martial arts/boxing/fighting

• MOI:
  – Direct axial force caused by punching another person or object
  – Direct impact to hand
Boxer’s fracture
Signs and Symptoms

- Point Tenderness over the metacarpal involved
- Palpable defect in the shaft of the 5th metacarpal (or other metacarpals)
- Swelling
- Discloration
- Pain with movement
- Make sure the fracture is not open
Treatment

- RICE
- Splint/Immobilization
- ER/Ortho referral for x-ray/Treatment
- Reduction and casting
- Possible surgery needed if fracture not able to maintain alignment after reduction
Finger Injuries

- Mallet Finger
- Boutonniere Deformity
- Jersey Finger
- Gamekeeper’s Thumb
- Dislocation
- Fracture
- Sprain
- Subungual hematoma
• **MOI:**

• Blow to tip of finger, jamming it and avulsing the extensor tendon from its insertion at the distal phalanx

• Can cause an avulsion fraction as well
Signs and Symptoms

• Pain
• Point tenderness over dorsum of distal phalanx
• Deformity
• Unable to extend finger at DIP joint
• Avulsed bone may be palpable
Treatment

- RICE
- Splint into extension 8-10 weeks
- Physician referral
Jersey Finger

- MOI:
  - Forced extension/hyperextension of DIP joint
  - Grabbing on to a jersey
  - Rupture of flexor digitorum profundus tendon and or avulsion fracture
Signs and Symptoms

- POT over the volar surface of DIP joint
- DIP joint cannot flex
- Finger is in extended position
- Pain
- Swelling
- Discoloration
Treatment

• RICE
• Ortho Hand referral
• Surgery to repair rupture/avulsion need ASAP
• 12 week recovery
• May have weakness with motion due to poor gliding motion of tendon
Gamekeeper’s Thumb

• MOI:
  • Forced abduction and hyperextension of the proximal phalange of thumb
  • Falling on the thumb
  • Sprains UCL of 1st MP joint
Gamekeepers thumb
Signs and Symptoms

- Pain
- Point tenderness over UCL of thumb
- Swelling
- Discoloration
- Instability of joint
- Unable to grip
- Decreased Grip Strength
Treatment

• RICE
• Thumb Spica Cast/Splint initially
• Physician referral for x-ray to rule out avulsion fracture-May be a Stenar lesion
• Possible surgery
Interphalangeal Dislocation

- Can affect PIP or DIP joint
- Axial force to the tip of the finger
- Blow to tip of finger
- Falling directly on extended finger
  - May rupture tendon, avulse bone, pinch volar plate
Joint Dislocation
Signs and Symptoms

- Pain
- Deformity
- Swelling
- Discoloration
Treatment

• Immediate reduction needed
• Ortho Hand referral for reduction & x-rays
• Splint (about 3 weeks)
• RICE
• Start ROM ASAP when stable so that the joint does not get stiff
• Buddy tape it to the next larger finger to start protective ROM
Finger Sprain

• MOI:

• Axial force to the tip of the finger, “jamming” it
Signs and Symptoms

- Pain
- Point tenderness over the collateral ligaments
- Swelling
- Discoloration
- Joint Instability
Treatment

• RICE
• Splint
• Physician referral if necessary for x-rays
• Start moving so that doesn’t get stiff
• Buddy tape it to the next larger finger to start protective ROM
Elbow Injuries

• Fracture
  – Olecranon, Radial Head/Neck, More severe fracture
• Tendonopathies
  – Lateral Epicondylitis
  – Medial Epicondylitis
  – Triceps tendonitis/avulsion/Rupture
  – Distal Biceps tendon rupture
• Apophysitis
  – Little Leager’s Elbow
• Diagnostic Evaluation
  – Xrays-AP/Lateral/Oblique, MRI
Olecranon Fractures

- **Treatment**
  - ORIF for Any displacement
  - Splint/Cast if no displacement
Radial Head/Neck Fx

- MOI: Fall outstretched hand
- Tx: Depends on Fx Displacement
  - Type I/II
    - Immobilize for a short period of time 2-3 weeks
    - Then start moving elbow to prevent stiffness
  - Type III/IV
    - ORIF
    - Radial head replacement
Lateral Epicondylitis

• “Tennis Elbow”
• Inflammation and Micro tears of Common extensor tendon
• Fibroangioplastic change of ECRB tendon
• S/S:
  – Lateral elbow pain with gripping, shaking hands, lifting objects, turning door knobs
  – Pain and weakness with wrist extension and supination
• Treatment
  – NSAIDS
  – Wrist Splint
  – Chopat Strap
  – Physical/Occupational Therapy
  – Injections-Cortisone or PRP
  – Surgery for lateral epicondylectomy and common extensor tendon repair-Chronic cases
Triceps Tendonitis/Rupture

- Tenderness at the tip of the olecranon
- Signs/Symptoms:
  - Tenderness noted at the tip of the Olecranon
  - Obvious defect of the Triceps tendon
  - Weakness with Elbow Extension

- Evaluation
  - MRI to evaluate extent of injury if concerned for Rupture

- Treatment
  - Tendonitis
    - NSAIDS
    - Physical/Occupational Therapy
  - Rupture- Surgery is needed ASAP within 3-4 weeks of injury to repair the tendon
  - Sometimes pt fracture through Olecranon Traction Spur-Resect spur and repair tendon
Biceps Tendon Rupture

• Signs/Symptoms:
  – Deformity Anterior elbow/Arm, Proximal Migration of the biceps tendon/Muscle
  – Bruising/Swelling
  – Pt feel a pop with lifting-weight/furniture
  – Weakness with elbow Flexion/Supination

• Evaluation
  – MRI-ASAP to evaluate extent of Injury

• Treatment
  – Partial tears-Can be treated conservatively with physical therapy, NSAIDs
  – Rupture- Surgery is needed ASAP within 3 weeks of injury to repair the tendon to have optimal outcome
  – Waiting >3-4wks makes surgery harder and compromises outcome
Little Leaguer’s Elbow

• **Signs/Symptoms:**
  – Medial Elbow Discomfort
  – Pain with throwing activities
  – Decrease pitch/throwing velocity and distance
  – Baseball pitchers/player, age 9-14 y/o
  – 4/5 Strength with Elbow Flexion/Pronation
  – Pain with Valgus stress 20 degrees, no laxity

• **Evaluation**
  – Xrays-Show widening of growth plate
  – Get comparison AP of contralateral elbow

• **Treatment**
  – Shut down from Throwing
  – Physical therapy, NSAIDs
  – Pitch Count to prevent from occurring
  – Surgery if avulsion of medial epicondyle occurs
Shoulder Injuries

• Sternoclavicular joint
• Acromioclavicular Joint
• Glenoid Labral Injuries/Shoulder Instability
  – SLAP tear
  – Anterior and Posterior glenoid labral tears
• Rotator Cuff tears
• Fracture
  – Clavicle
  – Proximal Humerus
• Apophysitis
  – Little Leager’s Shoulder
Acromioclavicular Joint

• MOI:
  – Direct fall onto shoulder
• Signs/Symptoms:
  – Pain at AC joint
  – Elevation of distal clavicle in relation to acromion
  – Initially pain with shoulder elevation/movement

• Evaluation
  – Xrays of AC joint w/ and w/o weights with comparison to contralateral AC joint
  – Cross arm adduction view

• Six Types
  I-AC ligament complex sprain w/o disruption
  II-AC ligament complex/capsule disruption, 50% vertical subluxation
  III-AC and CC ligaments disrupted 100% vertical subluxation
  IV- Distal Clavicle displacement posteriorly
  V- Extreme clavicle displacement (100-300%) disruption of delto-trapezial fascia distally
  VI-Inferior distal Clavicle displacement
Acromioclavicular Joint

- Treatment
- Types I-III
  - Conservative Treatment
  - Sling 1-2 weeks
  - NSAIDS
  - Physical Therapy
  - Passive Supine Forward elevation, motion
  - Gradual Progression to AAROM/AROM
  - Return to Play 2-6 weeks
- Types IV-VI and Chronic/Symptomatic Type III
  - Surgical Intervention
    - Modified Weaver Dunn
    - Open Anatomic Reconstruction
    - Arthroscopic Reconstruction
Glenoid Labral Tears

- **MOI:**
  - Varying MOI that could cause a glenoid labral tear
    - SLAP tear—Overhead throwing activates
    - Anterior/Posterior Labral tears—subluxation/dislocation events

- **Signs/Symptoms:**
  - Feeling of shoulder instability
  - Pain with throwing activates
  - Diminished strength because of instability
  - Apprehensive to put arm in position of instability/dislocation (ABD/ER)

- **Evaluation**
  - Shoulder Xrays—AP, NEER, Axillary, Scapular-Y, Striker Notch View—look for joint congruity and bony avulsion
  - MRI Arthrogram—gives us better detail of labral tissue, need the contrast to get better definition of the tissue plains
  - CT scan—if concerned for bone loss
Glenoid Labral Tears

- Specific Clinical Examination test
  - **O’Brien Test** - Dynamic test for SLAP tears
  - **Speed’s/Yergason’s Test** - Dynamic test for Bicep tendonitis
  - **Apprehension and Relocation test** - Test for Anterior Glenoid Labral injuries - Bankart Lesion
  - **Load Shift/Posterior Jerk test** - Test for Posterior Glenoid Labral Injuries
Glenoid Labral Tears

• **Treatment**
  
  – **Dependent**
    - Extent/Severity of injury
    - Recurrent Injury
    - Patient Symptoms
  
  – **First Time Dislocations/Injuries**
    - RICE-Sling until symptoms diminish
    - Physical Therapy
    - NSAIDS
    - Activity Modification

  – **Surgical Fixation**
    - Significant injuries
    - No improvement with conservative Intervention
    - Initial surgical intervention-Arthroscopic Fixation of Labral/Capsular Injury
    - Later Jet with recurrent instability and glenoid bone loss
Rotator cuff tears

- **MOI:**
  - Varying MOI that could cause a Rotator cuff tear
  - Lifting something heavy—hear/feel a pop in the shoulder
  - Shoulder dislocation in older patient population

- **Signs/Symptoms:**
  - Rotator cuff weakness
  - Pain with impingement tests—Neer/Hawkins Test with associated weakness

- **Evaluation**
  - Shoulder Xrays-AP, NEER, Axillary, Scapular-Y, assess for humeral head elevation, osteoarthritis
  - MRI
  - MRI arthrogram—Previous RTC repair or more severe injury
Rotator cuff tears

- Specific Clinical Examination test
  - Shoulder abduction - Supraspinatus
  - Empty can - Infraspinatus
  - ER with arm at side - IF and Teres Minor
  - IR with arm at side - Subscapularis
  - Belly Press - Lower Subscapularis
  - Lift Off Test - Upper Subscapularis
  - Hawkin’s/Neer - Subacromial Bursitis
Rotator cuff Tears

- Treatment
  - Assess
    - Extent/Severity of injury
    - Pain level
    - Strength Level
    - Patient Symptoms
    - MRI findings
  - Partial tears
    - RICE-Sling until symptoms diminish
    - Physical Therapy
    - NSAIDS
    - Activity Modification
  - Surgical Fixation
    - Full thickness tears
    - Lack of improvement with conservative intervention
    - Surgical intervention-Arthroscopic vs. Open Rotator cuff repair
Clavicle Fracture

- MOI:
  - Fall onto the shoulder

- Signs/Symptoms:
  - Deformity noted of the shoulder
  - Weakness and pain with RTC testing because of the fracture

- Evaluation
  - Clavicle/Shoulder Xrays

- Treatment
  - Dependent on Fracture Displacement
  - Majority of fractures are treated with sling and support
  - Figure-8 brace have not been proven to be affective
  - ORIF
    - Fractures shortened/displaced >2cm
    - Fracture nonunion
    - Fracture tenting the skin
    - Comminuted fracture
    - Fracture involving other areas of the shoulder (scapula/proximal humerus) Floating shoulder
Little Leaguer’s Shoulder

• **Signs/Symptoms:**
  - Shoulder pain with throwing
  - Decrease pitch velocity and distance
  - Baseball pitchers/player, age 9-14 y/o
  - Pain with overhead activities
  - RTC/Shoulder weakness

• **Evaluation**
  - Xrays-Show widening of growth plate
  - Get comparison contralateral shoulder Xrays

• **Treatment**
  - Shut down from Throwing
  - Physical therapy, NSAIDs
  - Pitch Count to prevent from occurring

**Maximum Pitch Counts—Minor League (AA Baseball recommendations)**

<table>
<thead>
<tr>
<th>Age, y</th>
<th>Pitch Approved to Throw</th>
<th>Pitches per Game</th>
<th>Pitches per Week</th>
<th>Pitches per Season</th>
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<tr>
<td>8–10</td>
<td>Fastball</td>
<td>50</td>
<td>75</td>
<td>1000</td>
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<tr>
<td>11–12</td>
<td>Change-up</td>
<td>75</td>
<td>100</td>
<td>1000</td>
</tr>
<tr>
<td>13–14</td>
<td>Curve</td>
<td>75</td>
<td>125</td>
<td>1000</td>
</tr>
<tr>
<td>15–16</td>
<td>Slider, forkball, splitter, knuckleball</td>
<td>90</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>17–18</td>
<td>Screwball</td>
<td>105</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Hip Injuries

• Majority of Sports hip injuries are related to soft tissue/muscular injuries that get better with conservative measures
  – Rest, NSAIDS, Physical Therapy

• Increased knowledge and understanding of hip structures and bony anatomy over the past 15 years have helped us preserve hip joints longer
  – Femoral acetabular impingement
  – Acetabular Labral Tears
**Acetabulum Labrum**

- Its role in hip joint biomechanics and joint health has been of particular interest over the past decade.
- Ring of fibrocartilage (fibrous cartilage) that runs around the acetabulum (cup) of the hip joint and increases its depth.
- Increasing contact area thereby reducing contact stress.
- The labrum deepens this and effectively increases the surface (and strength) of the hip joint.
- In normal hip joint biomechanics, the labrum is crucial in retaining a layer of pressurized intra-articular fluid for joint lubrication and load support/distribution. Decreasing friction between the acetabulum and femoral head cartilage.
- Its seal around the femoral head is further regarded as a contributing to hip stability through its suction effect.
Labral Tear and (FAI)

- In 1990’s Dr. Ganz and colleagues introduced the concept of Femoroacetabular Impingement (FAI) as a cause of hip pain, labral tears, and early arthritis.
Labral Tear and (FAI)
Labral Tear and (FAI)

- Clinical Examination
  - Anterior Groin pain
  - “C-Sign”
  - Limitation in ROM of hip
    - Specifically IR with the hip at 90 degrees flexion
  - (+) Impingement test
  - Assess for hip flexor weakness and anterior groin pain
Labral Tear and (FAI)

- Radiographic assessment
  - Xrays
    - AP, Dunn Lateral View, Frog Leg lateral View, False Profile View
  - MRI Arthrogram - Needed to assess for Labral tear
  - CT scan - done in certain situation to assess bone anatomy
Labral Tear and (FAI)

Treatment

• Conservative treatment
  – Physical therapy
  – Intra-articular Cortisone/PRP injections
  – NSAIDS
  – Activity Modification

• Surgical Treatment
  – Arthroscopic Intervention
  – Labral Repair
  – Labral Reconstruction
  – Pincer-Acetabuloplasty
  – CAM-Femoral Osteochondroplasty
Knee Injuries

- Collateral Ligament Injuries
  - MCL
  - LCL
  - PLC-Posterior Lateral Corner

- Cruciate Ligament Injuries
  - ACL
  - PCL

- Meniscus Injury
  - Medial
  - Lateral

- Chondral/Cartilage Injuries

- Patella Dislocation
Knee Assessment

• Swelling/Bruising
• ROM
• Point Tenderness
• Ligament examination- Grading of Laxity noted
  – ACL- Lachmann’s, Anterior Drawer, Pivot Shift
  – PCL- Posterior Drawer, Reverse Pivot Shift, Dial Test
  – LCL/PLC- Varus Laxity (0 and 30 degrees), Posterolateral rotatory instability, Dial Test
  – MCL- Valgus Laxity (0 and 30 degrees)
• Meniscus tears
  – Joint Line tenderness, McMurray’s Test
• Chondral Injury-Joint line tenderness
• Patella stability-
  – Patella Manipulation, Apprehension, Retinaculum tenderness
Knee Assessment

• Radiographic Evaluation
  – Xrays-Knee
    • AP
    • Lateral
    • Tunnel
    • Sunrise
    • Oblique
  – MRI

• Initial Treatment
  – Rest
  – Immobilize (Hinged Knee brace, Knee immobilizer)
  – Ice
  – Elevation
  – Pain Control
  – NSAIDS
ACL tear

- Treatment depends on the Severity of the tear (Full vs. Partial)
- KT-1000 test is sometimes performed to assess laxity of ACL compared to contralateral extremity if not a full tear
- Initiate Physical Therapy
  - Regain full ROM
  - Help to decrease swelling
  - Partial tears-Rehab to see patients needs reconstruction
- Surgical Reconstruction
  - Dependent on Extent of tear and Patients desires
  - Ligament is reconstructed with Autograft or Allograft
  - Autograft options:
    - Patella tendon
    - Hamstring Tendons
    - Quadriceps Tendon
    - Hamstring Augmentation
  - Allograft-Multiple different choices, Higher failure rate
PCL tear

- Treatment depends on the Severity of the tear
- Physical Therapy
  - Regain full ROM
  - Help to decrease swelling
  - Focus on Quadriceps rehab - Protective in PCL injuries
- Most patients can function with PCL injuries without it being reconstructed because majority of PCL are partial tear with Grade 1-2 Laxity
- Surgical Reconstruction - Arthroscopic reconstruction
  - Grade 3 PCL Laxity only occurs with other ligament injuries
  - Usually reconstructed with other Ligament injuries - ACL/LCL/PLC
  - PCL reconstruction usually performed with Allograft so that we can get a larger and longer Graft
  - More complicated surgery because of proximity of other important structures to the surgical Field - Nerves, Arteries and Veins in posterior aspect of knee
LCL/PLC tear

• Treatment depends on the Severity of the tear
• Physical Therapy
  – Regain full ROM
  – Help to decrease swelling
• Isolated LCL injuries are very rare
• Usually associated with PLC(Posterior Lateral corner injuries), PCL injuries
• Most LCL injuries are Partial tears that will heal with conservative Treatment
• Complete tears area usually associated with other ligaments that are injured and need Reconstruction
• Surgical Reconstruction-Open reconstruction
  – Allograft or Autograft depending on other ligaments that are being reconstructed
  – Large Lateral Incision- Need to identify the Common Peroneal nerve and protect it through out the case
  – Technically Challenging Surgery
MCL tear

- Physical Therapy
  - Regain full ROM
  - Help to decrease swelling
- Majority of MCL injuries are treatment conservatively
  - Broad ligament so has a high healing potential
- Hinged Knee brace to provide stability and protection to ligament as it heals
- Complete tears area usually associated with other ligaments that are injured and need Reconstruction
- Surgical Reconstruction-Open reconstruction
  - Repair or Allograft /Autograft Augmentation
  - Large Medial Incision
Meniscal Tear

- Most Common knee injury seen in clinic
- Symptoms
  - Knee Swelling
  - Mechanical catching symptoms
  - Joint line tenderness
  - (+) McMurray’s
- Problem with Meniscal tears is that there is a poor blood supply to the meniscus so a majority of the tears don’t heal
Meniscal Tear

• Key is to keep as much meniscus in the knee as possible, as long as possible-helps to decrease the joint reaction forces in the knee and maintains joint stability, joint congruity, and dissipates joint forces evenly from round femur to flat tibia

• Treatment
  – Arthroscopic Intervention
    • Repair
    • Resect torn meniscus-Meniscectomy
Patella Dislocation

- Very common in young athletes
- Lateral patella dislocation
- Multiple factors affect the stability of patellofemoral joint
  - Trochlear Congruity
  - Tibia Tubercle position
  - Retinacular Injuries-MPFL injury

Treatment
- Initial Treatment: Rest, ICE/Immobilization, Compression, Elevation, NSAIDS
- Physical Therapy
- Brace to provide stability to the Patella-Lateral -J Brace
- Majority can be treated conservatively
- Surgical Treatment
  - Patient with recurrent dislocations
  - Loose Bodies/Cartilage Injuries from Dislocation
  - Tibia Tubercle Anteromedialization Osteotomy help with distal alignment issues
  - MPFL reconstruction
Ankle Injuries

- Ankle Sprain - Most common Injuries seen in ER and Office visits
  - Low Ankle Sprain
  - High Ankle Sprain
- Ankle Fracture
- Cause
  - Usually rolling the ankle/twisting injury
- Signs and Symptoms
  - Pain
  - Swelling
  - Inability to bear weight
  - Bruising
- Radiographic Evaluation
  - Xrays - AP/Lateral/Mortoise views - Weight bearing if possible
    - Ottawa Ankle Rules
  - MRI if concerned about significant ligament injury or cartilage injury
Ankle Sprain

- **Signs and Symptoms**
  - Swelling
  - Bruising
  - Inability to bear weight
  - Feeling of instability

- **Physical Examination**
  - Point tenderness
    - Lateral ankle- ATL/CFL
    - Medial Ankle-Deltoid Ligament
    - Syndesmosis
  - Assess Ankle stability
    - Anterior Drawer - Squeeze Test
    - External rotation test
    - Talar Tilt test
    - Inversion/Eversion assessment
  - Assess motor function
  - Pain with resisted motion/strength testing
Ankle Sprain

- **Low Ankle Sprain**
  - Ligament Structures below the level of the Syndesmosis/Mortoise

- **High Ankle Sprain**
  - Ligament Structures at the level or above the Syndesmosis-Tibiofibular Ligaments and Interosseous membrane
  - Need to make sure to assess for Complete Syndesmosis injury because needs surgical Stabilization if present
Ankle Sprain

- Treatment

**Conservative Management**

<table>
<thead>
<tr>
<th>Max. protection phase</th>
<th>Mod. Protection phase</th>
<th>Min. protection phase</th>
<th>Return to activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 Days</td>
<td>4-10 Days</td>
<td>11-21 Days</td>
<td>3-8 weeks</td>
</tr>
<tr>
<td>• PRICE formula</td>
<td>• Non weight bearing AROM</td>
<td>• Weight bearing as tolerated</td>
<td>• ↑ Weight bearing as tolerated</td>
</tr>
<tr>
<td>• Protection with a splint</td>
<td>• Cross-fiber massage</td>
<td>• Initiate Eccentric ex.</td>
<td>• Agility drills.</td>
</tr>
<tr>
<td>• Icing every 2 hours during 1st 48 hours</td>
<td>• Grade 2 joint mobilization</td>
<td>• Toe walks</td>
<td>• Adv. Exercises Static→dynamic</td>
</tr>
<tr>
<td>• Elevation to reduce swelling</td>
<td>• Toe curls</td>
<td>• Subtalar mobilization</td>
<td>• Isokinetic resistance training</td>
</tr>
<tr>
<td>• Gentle mobilization to inhibit pain</td>
<td>• Seated calf stretches</td>
<td>• Tape or Brace for sports or other strenuous activities</td>
<td>• Specific sport training</td>
</tr>
<tr>
<td>• Partial WB with crutches</td>
<td>• Endurance training</td>
<td>• Proprioception/ balance board ex</td>
<td>• Protective bracing for participation into a sports</td>
</tr>
</tbody>
</table>

Ankle Sprain

- Low Ankle Sprain
  - Surgical Intervention
    - Chronic Ankle Sprains and Instability
    - Make sure to assess for Talar chondral injury
    - Ligament reconstruction
- High Ankle Sprain
  - If Syndesmosis is unstable then needs to stabilized
Ankle Fracture

• Varying types of fracture patterns depending on position of foot at the time of injury and the direction of force applied to the ankle

• Radiographic Evaluation
  – Xrays-AP/Lateral/Mortonise views-Weight bearing if possible

• Ottawa Ankle Rules

• Fracture Classification
  – Weber A-below Syndesmosis
  – Weber B-at level of Syndesmosis
  – Weber C-Above level of Syndesmosis
Ankle Fracture

• Treatment
  - Immobilize Ankle and referral
  - Non weight bearing on Crutches
  - Cast Stabilization
    • Minimal displacement at fracture site—Primarily isolated lateral malleolus fractures
  - More Strict Surgical Treatment criteria
    • ORIF—More than 2mm displacement at Fracture site because of long term affect on joint longevity for even minor joint laxity/motion
Thank You

Questions?