Evaluation of the Injured Knee and Shoulder
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SESSION OBJECTIVES

• Discuss the anatomy of the knee and shoulder.
• Discuss common injuries to the knee and shoulder including typical presentation and mechanisms of injury.
• Demonstrate and allow for audience participation in the examination of the shoulder and knee and discuss appropriate use of imaging.
• Discuss operative and non-operative approaches for the management of these injuries.
Weak in the Knees
Acute Knee Injuries

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Northeast Regional
Nurse Practitioner Conference
Knee Anatomy

- **Patellofemoral joint**
  - Articular cartilage

- **Tibiofemoral joint**
  - Articular cartilage
  - Meniscus
  - Ligaments
Knee Anatomy

- **Ligaments:**
  - Anterior cruciate ligament (ACL)
  - Medial collateral ligament (MCL)
  - Posterior cruciate ligament (PCL)
  - Lateral collateral ligament (LCL)
Knee Anatomy

- Patella (knee cap)
- Lateral collateral ligaments
- Lateral meniscus
- Medial meniscus
- Articular cartilage
- Anterior cruciate ligament (ACL)
- Posterior cruciate ligament (PCL)
- Medial collateral ligaments
Knee Anatomy
Articular Cartilage

- Normal
- Abnormal
Acute Knee Injuries

- When evaluating, timing is important
- Earlier is better
- Muscle spasm and swelling can make examination difficult
Acute Knee Injuries

- Mechanism of Injury
- Location of Pain
- Effusion
Meniscus Injury
Meniscus Injury

- Most common knee injury
- Bimodal distribution
  - Teenagers (usually with ACL tears)
  - Those who think they are teenagers (Older Crowd)
Meniscus Anatomy

- Healthy Meniscus
- Torn Meniscus
Meniscus Anatomy

- Vascular Supply
  - At horn attaches to the tibia
  - Outer 1/3 or meniscal rim
Meniscus Anatomy

- Vascular Supply
Meniscus Injury

- Episodic, sharp pain
- NOT a dull throbbing pain (articular cartilage pain)
- Worse with deep bending
- Mechanical symptoms
  - Don’t confuse with patellofemoral
Meniscus Exam

- Effusion
- Pain with hyperflexion
- Pain along joint line
- McMurray’s positive
- Ask them to squat or “duck
Meniscus Exam

- McMurray Exam

During a McMurray test, the examiner simultaneously extends and rotates the lower leg. When a "click" is felt or heard at approximately 90 degrees, the test is positive and a meniscal tear may exist.
Meniscus Tear
MRI

- MRI to confirm PE
  - Tear pattern
  - Concomitant injury
Meniscus Tear
MRI
Meniscus Tear-Treatment

- Surgical (arthroscopy)
  - Ability to repair based on tear pattern, size, location, blood supply
Anterior Cruciate Ligament Injury (ACL)
ACL Tear-Mechanism

- **Contact**
  - Hit from either side with rotation

- **Non-contact**
  - Deceleration, rotation, hyperextension
ACL Tear
ACL Tear-History

- Hear a “pop”
- Immediate large effusion (1 hour)
- Unable to return to play
- Patient feels like knee shifts
ACL Anatomy

- Femur
- Patella
- Lateral collateral ligament
- Medial collateral ligament
- Posterior cruciate ligament
- Anterior cruciate ligament
- Fibula
- Tibia

A complete tear of the ACL
ACL Tear Examination

- Often limited by pain and guarding
  - Effusion
  - Hemarthrosis
  - Lachman
  - Anterior drawer
  - Pivot shift
ACL Examination

- **Lachman**
  - Most sensitive
  - Knee in 30 degrees of flexion
  - Hang heel off side of bed
  - Stabilize femur with one hand
  - Translate tibia with other hand
ACL Examination

- Anterior Drawer
  - Knee flexed to 80 degrees
  - Hamstrings are palpated
  - Proximal tibia moved anteriorly
  - Compare to contralateral knee
ACL Examination

- **Pivot Shift**
  - Hardest to do
  - Place a valgus stress
  - Internal rotation of foot
  - Flex knee beyond 30°
  - Should feel the tibia reduce from anteriorly subluxated position
ACL Tear - MRI
ACL Tear - MRI

bone bruise from direct impact of the 2 areas
ACL Tear- Treatment

- Generally surgical
  - Some exceptions
- ACL Reconstruction
ACL Reconstruction

- Patella Tendon
Posterior Cruciate Ligament Injury (PCL)
PCL Tear
History and Physical

- Blow to the anterior knee with the knee flexed
- Reports of instability are rare
- Large effusion, positive posterior sag
PCL Tear
Exam: Posterior Sag Sign
PCL Tear - MRI

- MRI to confirm diagnosis, check for concomitant ACL or posterolateral corner injury
PCL Tear - MRI

- Controversial
  - Young active patients
  - Avulsion injuries

- Most treated non-operatively

- Concomitant posterolateral injury requires surgery
Medial Collateral Ligament Injury (MCL)
Most common ligament injury

Usually caused by hit to the outside of the knee (valgus force)
MCL Injury - History

- Patients often describe feeling something give, but not a true pop
- Painful to flex the knee
- Ask them to point to location of pain - often exquisitely tender over medial epicondyle
MCL Injury - Examination

- No or small effusion
- Tenderness medial epicondyle
  - Usually torn from femur
- Valgus stress testing
MCL Injury
Location of Pathology

Femoral tear (65%)
Tibial tear (25%)
Joint line tear (10%)
Combined tear (Occasional)
MCL Injury - MRI

- If questionable laxity
- Large effusion
- Rule out other ligament injury
MCL Injury - Treatment

- Almost always non-surgical
- 95% will heal with support
- With concomitant ACL injury usually do not need to fix MCL
MCL Injury - Treatment

- Treatment based on severity
  - Grade I: no brace, early rehab
  - Grade II: brace 2-3 weeks
  - Grade III: brace 4-6 weeks
MCL Injury - Treatment

- Average return to full activity
  - Grade I = 5 days
  - Grade II = 17 days
  - Grade III = 33 days
Patella Dislocation
Patella Dislocation

- Usually twisting injury with valgus stress
- May have abnormal alignment
- Tear of medial patellofemoral ligament
Patella Dislocation
History and Physical Exam

- Patient describes kneecap out lateral
- Usually have a HUGE effusion
  - Won’t bend knee
  - Tender medial epicondyle
  - May be tender medial facet patella
Patella Dislocation
Exam: Mal-alignment
Patella Dislocation
Exam: Apprehension Test
Patella Dislocation
MRI
Patella Dislocation Treatment

- RICE
- Brace or tape to hold patella
- PT for quadriceps training
- Return to play after completing functional rehab / running program
Patella Dislocation Treatment

- 1st time dislocation treat non-operatively
  - 80% will heal
- MRI to look for loose fragments in the knee if persistent effusion
Patella Dislocation

Treatment

- Multiple dislocations will require operative treatment

- Each time patella dislocates, the articular cartilage can be injured on the femur or patella
Quadriceps Contusion
Quadriceps Contusion

- Direct blow to the thigh (quad)
- Hematoma in muscle
- Painful knee flexion
- Watch for compartment syndrome!
Quadriceps Contusion

Grade based on knee flexion at 24 hours

- Grade I: > 90 degrees
- Grade II: 45-90 degrees
- Grade III: < 45 degrees
Quadriceps Contusion Treatment

- Ice
- Keep knee maximally flexed
- +/- compression wrap
- NSAIDs controversial
Dreaded complication is myositis ossificans in quad muscle

- 9% incidence
- Higher when poor initial ROM, delayed treatment

- Immobilization increases chance of it
- Early ROM
Iliotibial Band (ITB) Friction Syndrome
ITB Friction Syndrome
History and Physical

- Overuse injury
- Worse with increased activity
- Dull, throbbing pain
- No effusion
- Pain over lateral epicondyle
- Tight ITB
ITB Friction Syndrome
Differential Diagnosis

- Popliteus tendonitis
- LCL sprain
- Lateral meniscus tear
ITB Friction Syndrome

Treatment

- Rest
- Ice
- Anti-inflammatory medication
- Ultrasound or massage therapy
- Stretching
- Gradual return to exercise
- Correct any biomechanical/training errors
Thank You!

Questions?
EVALUATION OF ACUTE SHOULDER INJURIES

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Case Scenario

- 57 year old male

- “I was attempting to pry a wheel off of a car at work, and the wheel sprung back...I felt a sudden pain in my right shoulder”
History

- Where is the pain
- What is the quality of the pain
- Precipitating and alleviating factors
- Associated medical conditions and social history
  - Most importantly smoking!
Physical Examination

- Should be systematic!
  - Inspection
  - Palpation
  - ROM and Strength
  - Special Tests
    - Rotator Cuff
    - Labrum and Biceps
    - Instability
    - AC Joint
Physical Examination

ROM and Strength

- Active and Passive ROM in BOTH shoulders
- Strength
Special Tests
Rotator Cuff

- Neer and Hawkins Test
  - Subacromial impingement a.k.a. bursitis

- Jobe’s Test
  - Rotator cuff tendonitis

- Belly Press and Lift Off Test
  - Subscapularis
Special Tests
Labrum and Biceps

- O’Brien Test
  - Superior labrum

- Speed Test
  - Biceps or labrum
Special Tests
Instability

- Apprehension and Relocation
  - Anterior instability

- Posterior Stress or Clunk Test
  - Posterior instability

- Load and Shift
  - Anterior or posterior instability
Special Tests
Acromioclavicular Joint

- Cross Body Adduction
Case Scenario

- Pain is constant
- Radiates from superior shoulder through upper arm to elbow
- Feels better in sling
- Worse with sleeping or any overhead activity
Case Scenario

- Inspection normal
- No point tenderness
- ROM 170 / 50 / L3 vs. 180 / 60 / T8
- No weakness with cuff testing
- + Neer + Hawkins + Jobe
- All other provocative testing negative
Management

- Immediate MRI Indications
  - Significant rotator cuff weakness

- Everyone else…
  - Rest, PT, medications, close F/U
  - Consider injection if chronic in onset
Case Scenario

- No significant weakness
- Started PT for shoulder with diagnosis rotator cuff strain
- Follow up in two weeks
Case Scenario

- ROM 100 (130) / 40 / L3
- + Neer + Hawkins + Jobe
- 4 out of 5 strength with rotator cuff strength testing
- MRI
Case Scenario

- MRI shows acute rotator cuff tear
- Proceed directly to surgical repair
Case Scenario # 2

- 47 YO male

- “I was lifting a heavy bucket of mud at work as a dry waller and felt a sudden tearing sensation in my left shoulder…”
Case Scenario # 2

- Inspection normal
- Tenderness at greater tuberosity
- Active ROM 60 / 50 / L1
- Passive ROM 180 / 50 / T12
- + Neer + Hawkins + Jobe
- Rotator cuff strength 4+
Case Scenario # 2

- MRI
- Large acute rotator cuff tear
- Surgical management
Case Scenario # 3

- 58 YO female

- “My right shoulder has been sore from repetitive use at the deli counter”

- Pain with repetitive use, significant night pain when sleeping on the right
Case Scenario # 3

- Inspection normal
- No tenderness to palpation
- Active ROM = Passive ROM 170 / 40 / L2
- + Neer + Hawkins – Jobe
- 5 of 5 rotator cuff strength
- All other provocative tests negative
Case Scenario # 3

- No weakness
- Chronic onset of pain
- Therapy and injection
- If no improvement after 4 to 6 weeks consider MRI to rule out underlying tear
Case Scenario # 4

26 YO male

“I was trying to take a keg down a flight of stairs on a dolly, it slipped and my shoulder felt like it pulled out of the socket…”
Case Scenario # 4

- Inspection normal
- Tender to palpation along anterior joint line
- Neer Hawkins Jobe negative
- O’Brien and Speeds positive
- Apprehension + relocation positive
- Posterior stress test test negative
- Normal rotator cuff strength
Case Scenario # 4

- Inspection normal
- Tender to palpation along anterior joint line
- Neer Hawkins Jobe negative
- O’Brien and Speeds positive
- Apprehension + relocation positive
- Posterior stress test negative
- Normal rotator cuff strength
Case Scenario # 4

- Suspected labral tear
- No real reason for acute MRI
  - Management would not be changed with MRI
- Start PT and anti-inflammatory
- If no improvement after 6 weeks
- MRI shows labral tear
Summary

- With careful history and physical examination the diagnosis can be made in most cases...not everyone needs an MRI!

- MRI if suspected large rotator cuff tear, or in patients who fail to progress with other treatment
Summary

- Never too much of a downside to giving someone 1-2 weeks of therapy or rest and re-examining the shoulder
  - At least from a surgeon standpoint…
  - Immediate MRI in everyone with work injury may lead to incidental findings
  - i.e. “What am I supposed to do with this information”
THANK YOU

Play like a champion today.