Clinical Pearls of the Shoulder and Knee Examination

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Nothing to disclose
Objectives

Upon completion of this presentation you will have increased knowledge and a comprehensive understanding of:

- Shoulder and knee anatomy
- Common injuries/conditions
  - Acute vs chronic
- Physical examination skills
  - ROM
  - Strength testing
  - Special tests
- Treatment and rehabilitation protocols
- ***MORE CONFIDENCE***
The Shoulder

- Challenging exam
- Other musculoskeletal complaints
  - Contribution from neck
  - Involvement of arm and back
- Multiple diagnoses
  - Acute vs chronic
Shoulder Pain: Differential Diagnoses

- Traumatic disorders
  - fractures
  - dislocations
  - instability
  - sprains/strains

- Degenerative
  - AC / GH joint disease

- Rotator cuff disease
  - Tears (partial vs. full-thickness)
  - Impingement
    - Bursitis, tendinitis
    - Calcific tendonitis

- Adhesive capsulitis (frozen shoulder)

- Cervical disease

- Myofascial pain
Common Shoulder Injuries

- Acute Onset
  - Fractures
  - Dislocations/Subluxations
  - Sprains/Strains
  - Contusions
  - Rotator cuff tears
  - Bicep tendon ruptures
  - Calcific tendonitis
  - Adhesive capsulitis

- Chronic
  - Osteoarthritis
  - Rotator cuff Impingement
  - Cervical disease
Shoulder disorders by age

- **Age 12-30**
  - Labral tears
  - Instability
  - Traumatic Disorders
  - Impingement syndrome

- **Age 30-50**
  - Rotator cuff disease
    - Calcific tendonitis, bursitis, tendinitis
  - Adhesive capsulitis
  - Early degenerative conditions (AC, GH its)

- **Age 50-90**
  - Fractures
  - DJD
  - Adhesive capsulitis
  - Rotator cuff
    - Tears
    - Impingement
    - Calcific tendonitis
Overview of the shoulder

- History
- Anatomy
- Physical Exam
- Disorders/Injuries
- Treatment/Rehab

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- Demonstration
- Hands-on
Shoulder History

- Age
- Hand dominance (RHD, LHD)
- Occupation
- Hobbies, recreational activities, fitness level
- Pain
  - score (w/activity vs. rest)
  - type of pain (radiating, sharp, dull, ache)
- Location
- Onset
- Precipitating factors
- Previous treatments: prior injuries or surgeries, medications, PT, injections, etc.
- Neck pain
- Neurological complaints (numbness, tingling, weakness)
Shoulder Anatomy

- **Bony**
  - Humerus
  - Scapula
  - Clavicle

- **Joints**
  - Sternoclavicular
  - Glenohumeral
  - Acromioclavicular
  - Scapulothoracic
Shoulder Anatomy

- **Soft tissue**
  - Trapezius, rhomboids, serratus, pectoralis minor/major, latissimus dorsi, deltoïds, SCM
  - Rotator cuff (SITS)
    - Supraspinatus
    - Infraspinatus
    - Teres minor
    - Subscapularis

- Capsule and Ligaments
  - AC, CC and SC ligaments

- Labrum

- Tendons
  - RC tendons
  - Long head of bicep

- Subacromial and subdeltoïd bursa
Nerves of the Shoulder

- Brachial plexus
  - C5-C8, T1
- Lie between or amongst the scalene muscles and pass between the clavicle and 1st rib
- Associated nerves: Axillary, musculocutaneous, dorsal scapular, subscapular, suprascapular and pectoral
Shoulder Physical Exam

- Observation
  - Scars, abrasions, lacerations
  - Erythema
  - Swelling
  - Ecchymosis
  - Deformity
    - Bony or soft tissue
      - pop-eye
      - scapular winging/dyskinesia
      - fracture, step-off
  - Asymmetry
  - Atrophy
  - Guarding
  - Posture
    - protraction, kyphosis, scoliosis
Shoulder Physical Exam

- Palpation
  - Crepitus
  - Increased warmth
  - Sensation
  - Capillary refill
  - Tenderness
  - Sensitivity to light touch
  - Deformity or defect

- C spine
  - Spinous processes
  - Upper trapezius

- Shoulder
  - AC and SC joints
  - Greater tuberosity
  - LHB tendon
Shoulder Physical Exam

- Range of motion (ROM)
  - Neck and shoulders
  - Always assess bilaterally
  - Active and passive
Shoulder Physical Exam

- Neck ROM
  - Active flexion
  - Extension
  - Lateral flexion/bend
  - Rotation

- Passive ROM
Shoulder Physical Exam

- **Shoulder ROM**
  - Forward elevation (flexion)
  - External rotation
  - Internal rotation w/adduction (to vertebral level)
  - Cross body adduction

Scapular winging or dyskinesia?
Shoulder Physical Exam

- **Strength testing**
  - Assess bilaterally
  - Abduction
  - Internal/external rotation
  - Rotator cuff
  - Elbow flexion and supination
  - Bicep

- **Reflex Testing**
  - Bicep
  - Tricep
Special Tests

- Neck
  - Compression Test
    - Axial load and Spurling’s
  - Brachial Plexus Stretch Test
  - radicular pain w/passive neck extension?
Special Tests

- Shoulder
  - Drop arm
  - Empty Can
  - Neer
  - Hawkins-Kennedy
  - Speed’s
  - O’Brien
  - Belly press
Special Tests

- **Drop arm**
  - Instruct pt to fully abduct arm, then ask pt to slowly lower arm to side
  - Positive finding: arm drops to side from position of 90 degrees abduction
  - Rotator cuff tear
    - supraspinatus
Special Tests

Empty Can Test

- Both shoulders are abducted to 90 degrees and horizontally adducted to 30 degrees; shoulder is then internally rotated so that thumbs are facing the floor.
- Resist pt on abduction of both shoulders.
- Positive finding: pain and weakness.
- Rotator cuff impingement/tendonitis, tear?
Special Tests

- **Neer Sign**
  - Passively maximally forward flex shoulder, while stabilizing scapula
  - Positive finding: painful arc and apprehension
  - Rotator cuff and/or bicep impingement
Special Tests

- Hawkins sign
- Forward flex the shoulder and elbow each to 90 degrees, internally rotate the shoulder
- Positive finding: pain and apprehension
- Rotator cuff impingement
A: O'Brien Test
- Shoulder is forward flexed to 90 degrees and approximately 30 degrees of horizontal adduction and maximal internal rotation
- Resist pt’s ability to forward flex the shoulder
- Positive finding: pain and/or popping
- Superior labrum anterior posterior (SLAP) lesion or bicep impingement/tendonitis

B: Speed’s Test
- Shoulder is forward flexed to 90 degrees with forearm supinated
- Resist forward flexion
- Positive finding: pain over anterior shoulder
- Bicep tendonitis
Belly press test

- used to assess integrity of the subscapularis
- patient is instructed to press against abdomen with the palm of hand while keeping the arm in maximal internal rotation
- Positive test: Weakness; Elbow drops as result of inability to maintain IR
Shoulder Conditions
Rotator Cuff Pathology

- Impingement syndrome
  - Calcific tendonitis
- Rotator cuff tears
  - Partial thickness tears
  - Full thickness tears
  - Massive tears
Rotator cuff disease: impingement syndrome

- Tendinosis/bursitis
  - Subacromial
  - Supraspinatus

- History:
  - Pain reaching to side and back, overhead
  - Pain sleeping
  - atraumatic, possible h/o trauma

- Physical exam findings
  - Little to no weakness
  - + Neer
  - + Hawkins
  - + Empty can
  - (+Scapular retraction test)
Rotator cuff disease: impingement syndrome

- **Treatment**
  - NSAIDs
  - Rehabilitation
    - Postural training, periscapular stabilization, strengthening-RC and scapular ms (lower traps/lats/serratus)
    - Posterior capsule stretching
  - Activity modification
  - Injections
    - anesthetic + corticosteroid
  - Surgical intervention
Calcific tendonitis/Bursitis

- Calcification within rotator cuff tendon or bursa
  - Calcium hydroxyapatite crystal deposition disease
- ACUTE onset, very painful
- Painful arc of motion
- Treatment:
  - NSAIDs
  - Injection
  - PT
  - Surgery
Rotator cuff tears

- Follow impingement
- Can start small and progress
- Trauma
- Physical Exam findings
  - WEAKNESS
  - PAIN
Rotator cuff tears

- Treatment
  - Rehabilitation
  - Injections
  - Surgery
    - Arthroscopic repair
    - Not all tears require surgery
      - Especially partial thickness tears
      - Must be able to comply with post-op protocol/rehabilitation
      - What are functional goals?
      - Co-morbid conditions
      - Massive rotator cuff tears and muscle atrophy = not good surgical candidate
AC separation

- Various types
- Mechanisms:
  - Fall on tip of shoulder, arm adducted
  - FOOSH
- Possible bony deformity
- Pain on palpation of AC jt
- Pain on cross body adduction

- Differential dx: AC arthropathy; AC osteoarthritis

- Treatment:
  - Sling for comfort
  - NSAIDs
  - PT
  - Surgery in severe cases
Glenohumeral Osteoarthritis

- Degenerative process
- Progressive pain
- women > men
- Limitation in ROM
  - Active and passive
  - Forward elevation
  - External rotation
  - Internal rotation
  - Abduction
- Treatment
  - NSAIDs
  - PT
  - Injections
  - Surgery-Joint (total shoulder) replacement
    - 3rd most commonly replaced jt

(Izquierdo, R., Voloshin, I., et al., 2010)
**Adhesive capsulitis (frozen shoulder)**

- Women > Men
  - estimated 70% of patients with adhesive shoulder capsulitis are women (Hai, V.L, et al)
- **Diabetics**
- Painful shoulder
- Restricted ROM
  - insidious
  - Active and passive
- 3 phases (inflammatory, frozen, thawing)
- X-ray = normal; MRI may be normal, or may show capsular thickening
- Shoulder capsule thickens due to inflammation
Adhesive capsulitis/frozen shoulder

- Etiology
  - Primary causes
    - Idiopathic
      - Diabetes mellitus
      - Thyroid disease
      - Parkinson’s disease
      - Cardiac disease
  - Secondary causes
    - Post-traumatic
    - Post-surgical

- Treatment
  - NSAIDs
  - PT
  - Intra-articular Injection (US or fluoro guidance)
  - Arthroscopic surgery if no response to conservative treatment
  - TIME!!!
  - Arslan and Celiker (2001)
Adhesive Capsulitis cont.

- physiotherapy, hydrocortisone and manipulation under anesthesia
- none more superior than the other in reducing duration of d/o

- Dacre, et al. Prospective, blinded study compared efficacy of steroid injection with physiotherapy
- found local steroid injections as effective as physiotherapy alone or in combination
The Knee
Common Knee Injuries

- Athletic/Traumatic Injuries
  - Sprains
  - Contusions
  - Ligamentous injuries
  - Meniscal tears
  - Bursitis
  - Fractures

- Degenerative
  - Osteoarthritis

- Overuse
  - Patellofemoral syndrome
  - Tendonitis
  - Bursitis
  - Stress fractures
Overview of the Knee

- History
- Anatomy
- Physical Exam
- Disorders/Injuries
- Treatment
- Rehabilitation
Knee History

- Age
- Occupation
- CC:
  - Pain
  - Mechanical sx (catching, locking, instability)
  - Clicking, popping
  - Swelling, redness
- Location
- Onset
  - Injury?
    - Mechanism
  - Precipitating factors
- Prior injuries?
- Previous treatments: surgeries, medications, PT, injections
The Knee Anatomy

- Bones
- Ligaments
- Tendons
- Cartilage
- Meniscus
Bones of the Knee

- Femur (thigh bone)
- Tibia (shin bone)
- Fibula (lateral to tibia)
- Patella (knee cap)
Ligaments of the Knee

- Connect bone to bone
- Collateral ligaments:
  - LCL: lateral collateral ligament
  - MCL: medial collateral ligament
- Cruciate ligaments
  - ACL: anterior cruciate ligament
  - PCL: posterior cruciate ligament
Tendons of the Knee

- Tendons attach muscle to bone
- Tendons:
  - Patella tendon
  - Quadriceps tendon
  - Hamstring tendons
    - Pes anserine (sartorius, gracilis, semitendinosus)
    - Biceps femoris
  - Iliotibial band (ITB)
    - Not tendon nor muscle
    - Thick fascia
Cartilage and Meniscus

- **Articular cartilage**
  - Lines bones, allows for movement with little friction
  - “treads on a tire”
  - “Rhine on an orange”

- **Meniscus**
  - Cartilage that provides absorption and cushion between femur and tibia
  - Half-mooned shape, disc of fibrocartilage
    - Medial
    - Lateral
Observation
- Gait
- Guarding
- Erythema
- Edema (bursal, joint)
- Rash
- Ecchymosis
- Atrophy
- Deformity
  - Patella subluxation or dislocation; maltracking
Alignment
- Knees and feet
  - Genu valgum
  - Genu varum
  - Genu recurvatum
  - Femoral anteversion
  - Pronation/supination
    - pes planus/cavus/neutral
    - hindfoot valgus or varus
Knee Physical Exam

- Palpation
  - Warmth
  - Swelling
  - Deformity or defect
  - Crepitus
  - Popliteal space
  - Bursa
    - Pes anserine
    - Prepatellar
    - Superficial infrapatella
  - Medial/lateral joint line
  - Medial/lateral collateral ligaments
  - IT band
  - Patella tendon
  - Medial/lateral patellofemoral facets
  - Quad girth
Knee Physical Exam

- **Range of motion (ROM)**
  - Knee flexion and extension (0-140 degrees)
  - Tibial internal and external rotation
  - Hip internal and external rotation
  - Always compare bilaterally
  - Active and passive

- Fall directly on to anterior knee
  - can pt perform a straight leg raise?
  - Quad/patella tendon injury
Special Tests

- **Patella Apprehension**
  - Patient lying with knee in relaxed, extended position
  - Gently push the patella laterally
  - Positive finding: pt is apprehensive or demonstrates contraction of quadriceps to protect against subluxation/dislocation

- **Patella Grind/Compression**
  - With patient in same position as above:
    - Instruct patient to contract quadriceps while
    - Examiner applies downward and inferior pressure on the patella OR apply pressure directly down onto patella in a gentle grinding motion
  - Positive finding: pain or inability to complete test
  - Chondromalacia patella
Special Tests

- **Valgus Stress Test**
  - Subject lies supine with the knee in full extension; subject lies supine with knee flexed to 30 degrees
  - Examiner places proximal hand on lateral knee and distal hand on medial ankle. With ankle stabilized, apply a medial (valgus) force to the knee with proximal hand
  - Positive findings: pain and laxity
    - Laxity at 0 degrees or terminal extension=complete ligamentous tear
  - Injury to MCL
**Special Tests**

- **Varus Stress Test**
  - Subject lies supine with the knee in full extension; subject lies supine with knee flexed to 30 degrees
  - Examiner places proximal hand on medial knee and distal hand on lateral ankle. With ankle stabilized, apply a lateral (varus) force to the knee with proximal hand
  - Positive findings: pain and laxity
  - Laxity at 0 degrees or terminal extension = complete ligamentous tear
  - Injury to LCL
Special Tests

- **Lachman Test**
  - Patient lies supine with the knee flexed to 20 or 30 degrees.
  - Place proximal hand on distal thigh (laterally), just proximal to patella, and the distal hand on the proximal tibia (medially) just distal to the tibial tubercle.
    - Can also place your knee under patient’s knee to allow for them to relax.
  - From neutral position, apply an anterior force to the tibia with the distal hand, while stabilizing the femur with the proximal hand.
  - Positive finding: excessive anterior translation of the tibia.
  - ACL tear, complete or partial.
Special Tests

- Anterior Drawer Test
  - Patient lies supine with the hip flexed to 45 degrees and the knee flexed to 90 degrees. Foot in neutral position.
  - Examiner sits on the subject’s foot, with both hands behind the subject’s proximal tibia and thumbs on tibial plateau.
    - Be sure hamstrings are relaxed!
  - Apply an anterior force to the proximal tibia
  - Positive finding: increased anterior tibial displacement
  - ACL tear; partial vs complete
Special Tests

- **Posterior Drawer Test**
  - Patient lies supine with the hip flexed to 45 degrees and the knee flexed to 90 degrees. Foot in neutral position.
  - Examiner sits on the subject’s foot with both hands behind the subject’s proximal tibia and thumbs on tibial plateau.
    - Be sure hamstrings are relaxed!
  - Apply a posterior force to the proximal tibia
  - Positive finding: increased posterior tibial displacement
  - PCL tear; partial vs complete tear
    - SAG sign
Special Tests

- McMurray Test
  - Patient is lying supine with knee in relaxed position
  - Examiner places distal hand over patient’s heel and proximal hand on patient’s knee with fingers over medial and lateral joint line
  - With knee fully flexed, externally rotate the tibia, and apply valgus force, then extend the knee and repeat with the tibia internally rotated and a varus force applied
  - Positive finding: “click” or “pop,” pain
  - **Don’t be fooled by a “click” or “pop” from the patella!**
Meniscus Tears

- Twisting injury
- Sx:
  - Pain
  - Swelling
  - Catching/Locking

- Physical exam findings:
  - Joint effusion
  - Medial or lateral joint line tenderness
  - Limited ROM
  - +McMurray’s

- Treatment
  - NSAIDs
  - PT
  - Injections
  - Arthroscopic surgery
Collateral Ligament Injuries

- MCL/LCL sprain
  - Pain on medial or lateral knee
  - MCL: Force to lateral knee stressing medial knee
  - LCL: Force from medial aspect, stressing lateral knee
  - Little to no joint effusion
  - Full ROM
  - Valgus/varus stress (0 and 30)
    - Pain
    - Instability
Collateral Ligament Injuries

- **Treatment**
  - NSAIDs
  - Ice
  - PT: ROM, strengthening, balance and proprioception, hip strengthening, progression to physical activities
  - Brace
  - If grade III injury-brace for immobilization initially, surgery if multi-ligamentous injury
ACL injuries

- Typically, non-contact
- Cutting, turning, sudden deceleration
- Much higher incidence in women
- Jumping, pivoting sports
- CC: pain, swelling, felt pop, knee “gave out,” subsequent instability

Physical exam findings:
- Joint effusion
- + Anterior drawer
- + Lachman’s
ACL injuries

- Treatment:
  - Ice
  - NSAIDs
  - Crutches
  - Bracing
  - PT for ROM, quad strengthening, edema control
  - Surgery?
PCL sprain

- Mechanism:
  - Fall directly onto knee with foot plantar flexed
  - Dashboard injury (MVA)
  - Hyperextension
- CC: pain, felt pop, instability
- Physical exam findings:
  - Limitation in ROM
  - Joint effusion
  - + Posterior drawer
  - Sag sign
- Treatment: NSAIDs, Ice, bracing, PT, surgery-rare
Patellofemoral Syndrome: Runner’s knee

- **CC:** pain in front of knee/behind patella
- Precipitating activities: running, ascending/descending stairs, bending, kneeling, squatting, sitting, uphill/downhill
  - Theatre sign
- **Other sx:**
  - Giving way
  - Swelling
  - Crepitus
Patellofemoral Syndrome: Runner’s knee

- Physical exam findings
  - Positive patella grind
  - May be non-tender
  - Lateral tracking patella
  - “Squinting patellae”
  - Weak hips and quads (VMO)
  - Contracted lateral thigh (ITB)
  - Foot pronation
  - Single leg squat
    - Reproducible anterior knee pain
    - + trendelenburg
    - Valgus angulation at knee
Patellofemoral Syndrome/Runner’s knee

- **Treatment**
  - PT
    - VMO strengthening; Quad/ITB/ham flexibility; core stabilization; hip external rotator strengthening; balance and proprioception
  - Bracing
  - Taping
  - NSAIDs
  - Activity modification
  - Orthotics
  - Injection
  - Surgery – last resort
Iliotibial Band Syndrome

- IT Band-lateral thigh from hip to knee
- CC: lateral knee pain
- Cause:
  - Overuse from friction over lateral femoral condyle
  - Overpronation
  - Improper footwear
  - Weak hips
  - Linear activities: running, walking, cycling
- Treatment:
  - Rest, cross training
  - Ice, NSAIDs
  - Soft tissue mobilization: foam roller, manual therapy
  - PT: massage therapy, flexibility (quad/ham/ITB), strengthening (core, hips)
  - Injections
  - Surgery: Very rare!
Pes Anserine Bursitis

- (Hamstring tendonitis)
- CC: Pain anterior-medial knee
  - Sleeping
  - With activity

- Physical exam findings:
  - Pain on palpation of pes
  - Hamstring contracture

- Treatment:
  - NSAIDs, ice
  - PT: eccentric hamstring strengthening; ham/quad/ITB flexibility; balance and proprioception; hip strengthening
  - Injection
Tibial Stress Fractures

- Repetitive stress, overtraining
- ***HISTORY

CC: pain on weight bear, with activity, noc pain

Physical exam findings:
- Exquisite point tenderness, pain on weight bear, + hop test, +heel strike
- Often not apparent on Xray, may need to obtain MRI
Tibial Stress Fractures

- **Treatment:**
  - STOP RUNNING and impact activities
  - REST
  - Protective weight bearing, WBAT
  - PAIN
  - Non-impact activities
  - Tylenol, NSAIDs, Ice
  - Calcium/Vit D
  - Bone stimulator
  - PT
    - strengthening
    - progressive return to activity
Knee Osteoarthritis

- Degenerative process
- Progressive pain
  - Rest and activity
  - Bending, squatting, stairs
- Limitation in ROM
  - Flexion
  - Extension
- Treatment
  - NSAIDs
  - PT
  - Injections
  - Unloader brace
  - Surgery-Joint replacement
References

- www.guidelines.gov
- www.aafp.org
- www.aaos.org
Thank you!

Questions?

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Hands-On