Shoulder Injuries
Diagnosis and Management

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Learning Objectives

Identify steps in the general examination of the anterior shoulder.

Recognize the mechanisms of injury, clinical signs and symptoms, diagnostic tests, and treatment for common shoulder disorders.
Disorders Of The Shoulder

Shoulder Anatomy & Physical Examination

Fractures & Dislocations

Rotator Cuff Disorders

Separations
Anatomy Of The Shoulder Review
Bones

Scapula
- Spans ribs 2 to 7
- Three main processes
  - Spine
  - Acromion
  - Coracoid
Bones

Clavicle

Connects the sternum to the acromion
"S" shaped
Bones

Proximal humerus (parts)
- Head
- Anatomic neck
- Surgical neck (distal to the anatomic neck)
Bones

Proximal humerus (parts)
- Greater tuberosity (rotator cuff insertion - supraspinatus, infraspinatus, teres minor)
- Lesser tuberosity (rotator cuff insertion - subscapularis)
Bones

Proximal humerus (parts)

Intertubercular groove (bicipital groove) – Long head of the biceps
Joints

Glenohumeral joint
Sternoclavicular joint
Acromioclavicular joint
Scapulothoracic joint
Glenohumeral Joint

Ball (Humeral head) and socket (Glenoid)
Muscles provide the primary support
The labrum lines the glenoid cavity and deepens the socket
Ligaments - glenohumeral (inferior glenohumeral is the most important), coracohumeral, capsular
G-H Joint

- Scapula
- Clavicle
- Acromioclavicular joint/ligament
- Acromion
- Sternum
- Sternoclavicular joint/ligament
- Glenohumeral joint/ligament (capsule)
- Humerus
- Anterior view

Anterolateral view:
- Acromion
- Glenoid cavity
- Labrum
- Scapula
- Scapulothoracic articulation (joint)
Sternoclavicular Joint

Gliding joint
The only bony attachment to the Axial skeleton is the S-C Joint
Articular disc interspaced between surfaces
Rotates 30 degrees with glenohumeral motion
Ligaments - anterior and posterior sternoclavicular, capsular
Acromioclavicular Joint

Gliding joint

Disc interspaced between surfaces

Anchors the lateral clavicle
A-C Joint

Acromioclavicular joint & ligamentous capsule

Coracoacromial ligament

Joint capsule

Trapezoid

Coracoclavicular ligament

Conoid
A-C Joint
Scapulothoracic Joint

Soft-tissue joint

Allows for scapular translation
Muscles

Spine connectors
  - Trapezius (Upper, Middle & Lower)
  - Latissimus dorsi
  - Rhomboids (Major & Minor)
  - Levator scapulae
  - Scalenes

Thoracic connectors
  - Pectoralis major
  - Pectoralis minor
  - Subclavius
  - Serratus anterior
Muscles

Shoulder movers

Deltoids (abduction, flexion, extension, horizontal AB/ADduction)

Teres major (adduction, internal rotation)

Supraspinatus (abduction, external rotation)

Infraspinatus (external rotation)
Muscles

Shoulder movers

- Teres minor (external rotation)
- Subscapularis (internal rotation)
- Coracobrachialis (flexion)
- Biceps long head (flexion)
Muscles
Rotator cuff muscles ("SITS")
Supraspinatus
Infraspinatus
Teres minor
Subscapularis
Movers and dynamic stabilizers
Rotator Cuff

- Acromio-clavicular joint
- Greater tuberosity
- Coracoid process
- Subscapularis
Rotator Cuff

- Supraspinatus
- Infraspinatus
- Teres minor
Nerves

Brachial plexus
Brachial Plexus

- Musculocutaneous n.
- Radial n.
- Median n.
- Ulnar n.
Vessels

Subclavian artery

Axillary artery
(divided in thirds by the pectoralis minor)

Anterior Humeral circumflex artery: primary blood supply to the humeral head
Vessels

- Superior thoracic a.
- Thoracoacromial trunk
- Subclavian a.
- Posterior humeral circumflex a.
- Anterior humeral circumflex a.
- Subscapular a.
- Teres major tendon
- Lateral thoracic a.
- Brachial a.
- Pectoralis minor tendon
Range-of-motion

Abduction 170 to 180
Flexion and Elevation 160 to 180
Scapular Elevation 170 to 180
Lateral (External) Rotation 80 to 90
Medial (Internal) Rotation 60 to 100
Range-of-motion

...Cont’

Extension 50 to 60
Adduction 50 to 75
Horizontal AB/ADduction 130
Circumduction 200
Neurovascular Examination

Sensation

Axillary nerve (C5) lateral arm
Reflexes

Biceps (C5)

Brachioradialis (C6)

Triceps (C7)
Reflexes

Biceps
(C5)
Reflexes

Brachio-Radialis (C6)
Reflexes

Triceps (C7)
Dislocations/Separations

Definition: Complete or incomplete loss of congruity of a joint

Synonyms
- Subluxation
- Multi-directional Instability

Discussion
- Shoulder
Dislocations/Separations

Classification

TUBS -- Traumatic, Unidirectional, Bankhart lesion, Surgery
Dislocations/Separations

Classification

AMBRI -- Atraumatic, Multi-directional, Bilateral, Rehabilitation, Inferior Capsular Shift
Dislocations/Separations

Physical Exam
  + Apprehension Test
  + Reduction/Release Test
  + Sulcus Sign
  + Anterior/Posterior Translation/Drawer Test
  + Jerk Test
Dislocations/Separations

Physical Exam

Apprehension Test
Apprehension Test
Relocation/Release

Relocation

Release
(Apprehension Test)
Dislocations/Separations

Sulcus Sign
Dislocations/Separations

Anterior Translation

Posterior Translation

Anterior Translation
Dislocations/Separations

Jerk Test
Associated Injuries

Hill- Sachs defect - impression fracture in the posterolateral humeral head

Bony Bankhart lesion - anterior inferior glenoid rim injury

Greater tuberosity fracture - especially in older patients
Hill-Sachs defect from anterior glenohumoral dislocation or subluxation.

Glenoid

Scapula

Bankart lesion may include a glenoid rim fracture

Humerus

ANTERIOR
Hill – Sachs Lesion
Bony Bankhart Lesion
Associated Injuries

Associated fractures:

Reverse Hill - Sachs defect (hatchet-shaped anterior humeral head impression fracture)
Reverse Bankart lesion (posterior glenoid rim)
Lesser tuberosity fracture
Dislocations/Separations

Treatment for Acutely

Reduction

Sling/Immobilizer

x 4-6 wks

Physical Therapy
Dislocations/Separations
Dislocations/Separations

Physical Therapy

Acutely

Codman’s Exercises

Wand Exercises
Dislocations/Separations

Physical Therapy

Rotator Cuff Strengthening Exercises
Physical Therapy Exercises
Physical Therapy Exercises

EXERCISE 3

EXERCISE 4
Physical Therapy Exercises

EXERCISE 5
Dislocations/Separations

Prognosis

If pt’s age is < 30, redislocation rate is higher.......Surgery
If pt’s age is > 30, redislocation rate is lower.....Rehabilitation
Dislocations/Separations

Following acute injury -- Treatment based on many factors that relate to surgery

Atraumatic

Age (>35, 1st time dislocator generally does well with strengthening exercises)
Dislocations/Separations

Additional factors include:
  Multidirectional vs Unidirectional
  Activity level
  Symptoms
Dislocations/Separations

TX -- Surgical

Arthroscopic
  Bankhart repair
  Capsular shift

Open
  Bankhart repair
  Capsular shift

Usually a combination
Anterior Dislocation

Mechanism of Injury
Forced abduction and rotation

Signs/Symptoms –
Acute Pain, flattened Deltoid, anterior fullness, natural splinting, short squared shoulder
Anterior Dislocation

Radiology- True AP, Axillary lateral or West Point and Scapular Y views
Anterior Dislocation

Special tests

+ Anterior drawer/translation
+ Apprehension test
+ Reduction/release test
Anterior Dislocation

Treatment

Immediate reduction
Ice, rest
NSAIDs, ASA, Tylenol®
Shoulder Immobilizer or Sling & Swathe
PT - early gentle ROM
Anterior Dislocation

Treatment -- Surgical

Arthroscopic
  Bankhart repair
  Capsular shift

Open
  Bankhart repair
  Capsular shift

Usually a combination
Posterior Dislocation

Mechanism of Injury - Fall on the adducted and internally rotated arm
Posterior Dislocation

Signs/Symptoms - Severe Acute Pain, Prominent Coracoid Process, Arm will be adducted, internally rotated
Posterior Dislocation

Radiology- Shoulder series will indicate head of humerus posterior to the labrum
Posterior Dislocation

Special tests
+ Jerk Test
+ Reduction test
Posterior Dislocation

Treatment

Immediate reduction
Ice, rest
NSAIDs, ASA, Tylenol®
Shoulder Immobilizer or Sling & Swathe
PT - early gentle ROM
Posterior Dislocation

Treatment – Surgical

Arthroscopic
  Reverse Bankhart repair
  Capsular shift

Open
  Reverse Bankhart repair
  Capsular shift

Usually a combination
Inferior & Multidirectional Dislocation

Shoulder examination shows instability in multiple directions. Patients often display hyperelasticity (MP joints, elbow, shoulder, etc.)
Inferior & Multidirectional Dislocation
Inferior & Multidirectional Dislocation
Inferior & Multidirectional Dislocation
Inferior & Multidirectional Dislocation

Treatment
Nonoperative treatment favored
If Surgery – Capsular Shift
Acromioclavicular Separations

Acromioclavicular injuries (the so-called separated shoulder) can be classified into six types, and treatment is based on the specific type
A-C Separations

Mechanism of Injury: FOOSH or Fall onto the tip of the shoulder
A-C Separations
A-C Separations
Type I – AC ligament is partially disrupted; coracoclavicular (CC) ligament is intact
Type II – AC ligament is completely torn CC ligament is partially torn
Type III – AC & CC ligaments are completely torn & there is complete separation of clavicle from the acromion.
Types IV – VI are uncommon
A-C Separations

Signs and Symptoms

Pain over A-C joint & lifting of the arm
Swelling
With Type III & higher...there is an obvious and cosmetically displeasing deformity
A-C Separations
A-C Separations

Diagnosis

AP Xrays of both shoulders will confirm Type II or higher A-C separations (with & without weights)
A-C Separations
A-C Separations

Treatment

Type I & II:

Rest & Ice

Sling, Sling & Swath, Shoulder Immobilizer or Figure-of-8-clavicle brace X 4-6 Weeks

NSAIDs, ASA or Tylenol®
Analgesics esp. at night
A-C Separations

Treatment

Type III is controversial – Most are treated nonoperatively with good results
A-C Separations

Immobilizing devices
A-C Separations

Surgical repairs
Rotator Cuff Syndrome

Definition: Rotator cuff syndrome or disease or impingement syndrome is a continuum of pathology starting with inflammatory changes in the sub acromial bursa and rotator cuff tendons, which may continue on to become a rotator cuff tendon rupture or tear.
Rotator Cuff Syndrome

The rotator cuff is composed of four muscles: (SITS)
Supraspinatus
Infraspinatus
Teres Minor
Subscapularis
Rotator Cuff Syndrome

These muscles form a cover around the head of the humerus whose function is to rotate the arm and stabilize the humeral head against the glenoid.
Rotator Cuff Syndrome

Rotator cuff disease primarily affects the Supraspinatus tendon

Signs and Symptoms

Pain, esp. at night
Difficulty sleeping on it
Weakness
Catching
Grating esp. with lifting the arm overhead
Rotator Cuff Syndrome

Physical Exam

Tenderness over greater tuberosity or A-C joint

Muscle Atrophy

AROM is limited (esp. Abduction & IR) but PROM is usually normal except in patients with a frozen shoulder
Rotator Cuff Syndrome

PE

+ Drop-arm test
+ Lift-off test
Rotator Cuff Syndrome

Diagnosis

X-rays are usually normal unless DJD changes are present or in trauma

Osteophytes
Calcific changes within the tendon
A-C joint DJD
Rotator Cuff Syndrome

Treatment: Conservative

Rest, Ice & Passive ROM ex’s
NSAIDs
PT: strengthening esp. rotator cuff muscles
Rotator Cuff Syndrome

Treatment: Conservative

Avoid overhead and painful activities

Steroid injection should be used with caution (may decrease inflammation, provide pain relief, but steroid injections weakens tendon)
Rotator Cuff Syndrome

Treatment: Surgical
   Arthroscopic
   Open
Impingement Syndrome

Impingement between the rotator cuff tendons and subacromial bursa between the humeral head, greater tuberosity and the acromion occurs when the arm is elevated. This causes inflammation and edema and therefore increased impingement, in a self-perpetuating cycle……
Impingement Syndrome Classification

Stage I: Pt’s < 25 with reversible edema & hemorrhage

Stage II: Pt’s 25 – 40 with fibrosis, tendonitis & recurring pain with activity

Stage III: Pt’s > 45 with bone spurs or osteophytes & rotator cuff tendon rupture
Impingement Syndrome

Differential Diagnosis

Subacromial Bursitis
Supraspinatus Tendonitis
A-C Arthritis
Bicipital Tendonitis
Calcific Tendonitis
Adhesive Capsulitis
Thoracic Outlet Syndrome
Subacromial Bursitis

Signs and Symptoms

- Inability to use the arm in the overhead position (Flexed & Internally rotated or Abduction) due to pain, stiffness, weakness & catching
- Pain with sleeping on the affected side
- Pain in the acromial area
Subacromial Bursitis

Physical Exam
+ Neer Impingement Sign
+ Hawkins Impingement Sign
+ Impingement Sign

Differential Diagnosis
Impingement Test
Subacromial Bursitis

+ Neer Impingement Sign
Subacromial Bursitis
+ Modified Neer Impingement Sign
Subacromial Bursitis

+ Hawkins Impingement Sign
Subacromial Bursitis

Impingement Test – instill 10cc 1% plain local anesthetic into the subacromial space followed by impingement testing
Subacromial Bursitis

Complete pain relief supports a diagnosis of impingement syndrome.

To demonstrate supraspinatus weakness compare using the supraspinatus test – If initially patient was weak but strong post injection then inflammation & fibrosis is consistent vs rotator cuff tear.
Subacromial Bursitis

TX: Conservative

Rest & Ice

Avoidance of overhead activities

PT (ROM ex’s & Rotator cuff strengthening ex’s)

Ultrasound/Phonophoresis/ Iontophoresis

NSAIDs, ASA or Tylenol®

Corticosteroid injections
Subacromial Bursitis

Treatment: Surgical

- Bursectomy
- Acromioplasty (Decompression)
- Arthroscopically or Open
Supraspinatus Tendonitis

Signs and symptoms are identical to subacromial bursitis except the inflammation is within the tendon vs bursa
+ Supraspinatus test but no weakness
Supraspinatus Test
Supraspinatus Tendonitis

Treatment: Conservative
Rest & Ice
Avoidance of overhead activities
PT (ROM ex’s & Rotator cuff strengthening ex’s)
Ultrasound (Phonophoresis or Iontophoresis)
NSAIDs, ASA or Tylenol®
Corticosteroid injections
Supraspinatus Tendonitis

Treatment: Surgical

Arthroscopic (Debridement & Acromioplasty)

Open (Acromioplasty, Debridement & RC repair)
Acromioclavicular (A-C) Arthritis/Arthropathy

Signs and Symptoms
A-C joint tenderness
DJD change on X-rays

Physical Exam
+ Cross-body Adduction

Diagnosis
Lidocaine injection into the A-C Joint
Acromioclavicular (A-c) Arthritis/Arthropathy

+ Cross-Body Adduction Test
Acromioclavicular (A-C) Arthritis/Arthropathy

Xrays: DJD changes & possible osteolysis or bone cysts

Diagnosis: Lidocaine injection into the A-C Joint
Acromioclavicular (A-C) Arthritis/Arthropathy

Treatment: Conservative

Rest & Ice
Avoidance of overhead activities
PT (ROM ex’s & Rotator cuff strengthening ex’s)
Ultrasound (Phonophoresis or Iontophoresis)
NSAIDs, ASA or Tylenol®
Corticosteroid injections
Acromioclavicular (A-C) Arthritis/Arthropathy

Treatment: Surgical

Open (Acromioplasty & distal clavicle resection using Mumford procedure)
Bicipital Tendonitis

Signs and Symptoms
  Pain to palpation over bicipital groove or tendon

Physical Exam
  + Speed’s Test
  + Yergason’s Test
Bicipital Tendonitis

+ Speed’s Test
Bicipital Tendonitis
+ Yergason’s Test
Bicipital Tendonitis

Treatment: Conservative

Rest & Ice

Avoidance of overhead activities

PT (ROM ex’s & Rotator cuff strengthening ex’s)

Ultrasound (Phonophoresis or Iontophoresis)

NSAIDs, ASA or Tylenol®

Corticosteroid injections (BEWARE!)
Bicipital Tendonitis

Treatment: Surgical
  Arthroscopic
  Open
Calcific Tendonitis

Signs and Symptoms

Localized tenderness

Associated with impingement from increased size of the tendon
Calcific Tendonitis

Diagnosis

Xrays
Calcific Tendonitis

Treatment: Nonoperative
- Physical therapy
- Needling calcification with local anesthetic
- Radiotherapy

Treatment: Operative
- Surgical excision
Adhesive Capsulitis

“Frozen Shoulder”
Idiopathic loss of both active and passive motion
Most commonly affects patients between 40 & 60
Most common risk factor is DM Type I
Adhesive Capsulitis

Patients typically have 2 phases

“freezing” phase with pain & progressive loss of motion

“thawing” phase of decreasing discomfort associated with a slow but steady improvement in range-of-motion
Adhesive Capsulitis

Physical Exam -- reveals significant reduction in both active & passive range-of-motion, at least 50%, when compared with the opposite normal shoulder

Motion is painful, especially at the extremes

Pain & tenderness are common at the deltoid insertion
Adhesive Capsulitis

Treatment

NSAIDs
Non-narcotic analgesics
Moist Heat
Stretching program 3-4 x daily
? Consider a corticosteroid injection
Thoracic Outlet Syndrome

Thoracic outlet syndrome - compression of a portion of the brachial plexus, most commonly the lower portion [C8, T1], and the axillary artery.
Thoracic Outlet Syndrome

Etiology

Compression by the scalene muscles/first rib on the lateral cord of the brachial plexus and the subclavian artery
Thoracic Outlet Syndrome

Signs/Symptoms

Related to overuse - paresthesias to hand and arm, pain in upper extremity and neck, weakness of extremity, drooping of shoulder girdle, clear correlation with posture and position.
Thoracic Outlet Syndrome

Diagnosis
   Adson's Maneuver
   Wright's Test
   Roos Test
Thoracic Outlet Syndrome

Adson's maneuver - shoulder extension and head rotation to the ipsilateral side while holding a breath leads to loss of the radial pulse
Thoracic Outlet Syndrome

Modified Adson's (Wright's) test

Shoulder extension, abduction to 90 degrees, and external rotation with the head rotated to the contralateral side leads to loss of the radial pulse
Thoracic Outlet Syndrome

Roos test - the arms elevated past 90 degrees and the hands opened and closed rapidly 15 times leads to cramping/tingling of the hands (claudication)
Thoracic Outlet Syndrome

Treatment options

Nonoperative - physical therapy, postural training

Operative - first rib resection, others
Summary

Steps in the general examination of the anterior shoulder

Mechanisms of injury, clinical signs and symptoms, diagnostic tests, and treatment for common shoulder disorders