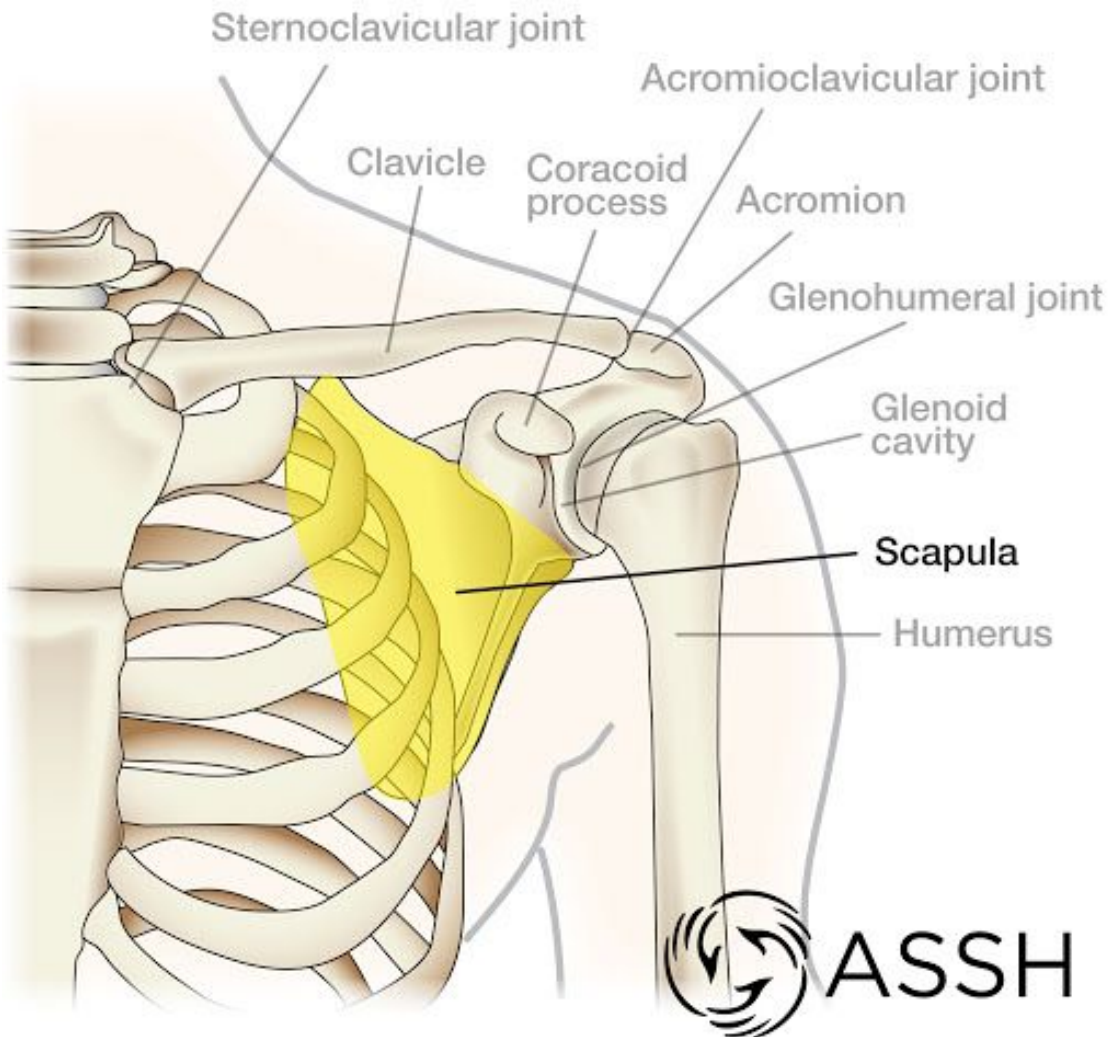


# Shoulder Assessment

Page 274

# Anatomy Review

Group read applied anatomy 274-283



A capsular pattern is a **proportional motion restriction unique to every joint that indicates irritation of the entire joint**. The shoulder joint has a capsular pattern where external rotation is more limited than abduction which is more limited than internal rotation (ER limitations > ABD limitations > IR limitations).

<https://www.youtube.com/watch?v=D3GVKjeY1FM>

# Glenohumeral Joint

- Resting position:  $40^{\circ}$ - $55^{\circ}$  abduction,  $30^{\circ}$  horizontal adduction
- Close packed: full abduction, lateral rotation
- Capsular pattern: lateral rotation, abduction, medial rotation

# Acromioclavicular Joint

- Resting position: arm resting by side in normal physiological position
- Close packed: 90° abduction
- Capsular pattern: pain at extremes of ROM, especially horizontal adduction and full elevation

# Scapulohumeral rhythm

- <https://www.youtube.com/watch?v=kkNnc6ssbPI>
- Read scapulohumeral rhythm article

# Patient history questions

- What is the patients age?
- Does the patient support the upper limb in a protected position or hesitate to move it?
- If there was an injury, what exactly was the mechanism of injury?
- Are there any movements or positions that cause the patient pain or symptoms?
- What is the extent and behaviour of the patients pain?
- Are there any activities that cause or increase the pain?
- Do any positions relieve the pain?
- What is the pt unable to do functionally?
- How long has the problem bothered the pt?
- Is there any indication of muscle spasm, deformity, bruising, wasting, paresthesia, or numbness?
- Does the pt complain of any weakness and heaviness in the limb after activity?
- Is there any indication of nerve injury?
- Which is the dominant hand?

# Homework

- Read observation pg 291-299

# ROM

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[https://www.youtube.com/watch?v=8\\_bjCGbLts](https://www.youtube.com/watch?v=8_bjCGbLts)  
o



# Textbook group read

- AROM pg 300-313

# AROM

- Abduction-  $170^{\circ}$ - $180^{\circ}$
- Forward flexion-  $160^{\circ}$ - $180^{\circ}$
- External rotation-  $80^{\circ}$ - $90^{\circ}$
- Internal rotation-  $60^{\circ}$ - $100^{\circ}$
- Extension-  $50^{\circ}$ - $60^{\circ}$
- Adduction-  $50^{\circ}$ - $75^{\circ}$
- Horizontal add/abd-  $130^{\circ}$
- Circumduction-  $200^{\circ}$
- Scapular protraction/ retraction

# PROM

- Elevation through forward flexion of the arm- tissue stretch
- Elevation through abduction of the arm- bone-to-bone or tissue stretch
- Elevation through abduction of the GH joint only- bone-to-bone or tissue stretch
- Lateral rotation of the arm- tissue stretch
- Medial rotation of the arm- tissue stretch
- Extension of the arm- tissue stretch
- Adduction of the arm- tissue approximation
- Horizontal adduction- tissue stretch or approx
- Horizontal abduction- tissue stretch

# RIM

- Forward flexion
- Extension
- Adduction
- Abduction
- Medial rotation
- Lateral rotation
- Elbow flexion
- Elbow extension

# Special tests

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# Shoulder Severe pathology tests – Glenohumeral Instability

- What is GH Instability?
  - GH instability is the inability to keep the head of the humerus centered in the glenoid fossa, caused by laxity in the shoulder capsule, ligaments and/or rotator cuff muscle imbalances or congenital anomalies
- Degrees of Instability
  - Apprehension – fear of shoulder dislocation
  - Subluxation – Partial separation of articular surfaces, humeral head generally spontaneously returns to normal position
  - Dislocation – Completer separation of articular surfaces

# GH Instability Continued

- How it happens? (How does this happen)
  - Traumatic – Instability secondary to damage of the rotator cuff, glenoid labrum and/or GH ligaments
  - Can be a single event or occur overtime
    - Direct trauma – an example could be a tackle from behind with arm abducted and externally rotated
    - Overuse – repeated over the head activities, swimmers or throwers for example
    - Intentional subluxation/dislocation – Client voluntarily displays instability

# How it happens? of GH Instability - continued

- Atraumatic ( not caused by trauma)
  - Congenital anomalies or family tendencies (Heredity)
  - In these circumstances the condition would most likely be bilateral
  - Glenoid Dysplasia (an abnormality in development) – shallow glenoid fossa or an anterior or posterior tilt of the glenoid fossa
  - Generalized joint laxity – less cross-linked collagen fibers create increased flexibility in a joint (hypermobile Joints)



# Health history

- The following may be indicated with the Clients health history and/or during consultation
  - General shoulder pain that worsens with activity or arm positions (overhead activity, carrying with arms at the side, Prior injury to the area, repeated use for an extended period of time
  - History of catching or locking
  - Prior history of injury ( dislocation)
  - Pain improves with heat or rest
  - May associate with impingement symptoms

# Observation – What you may see

- Possible Sulcus sign
  - Client seated or standing with arm hanging at their side, observed from anterior
- Redness may also be present

# Sulcus sign

Sulcus Sign



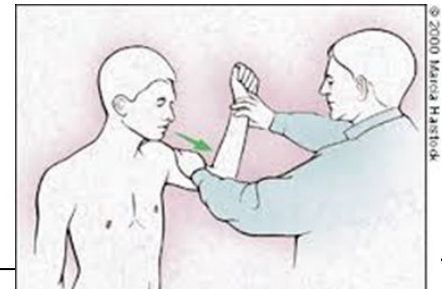
# Palpation & Movement

- Palpation – Pain or tenderness over the joint
- Trigger points of the rotator cuff
- Movement
  - AROM & PROM – repeatable clunk or apprehension with Abduction & external rotation
  - Pain or impingement at 80 – 120 degrees of Abduction with altered scapulohumeral Rhythm
  - RROM – Strength general within normal limits, some weakness may occur as a result of Pain or other damage

# Special Tests

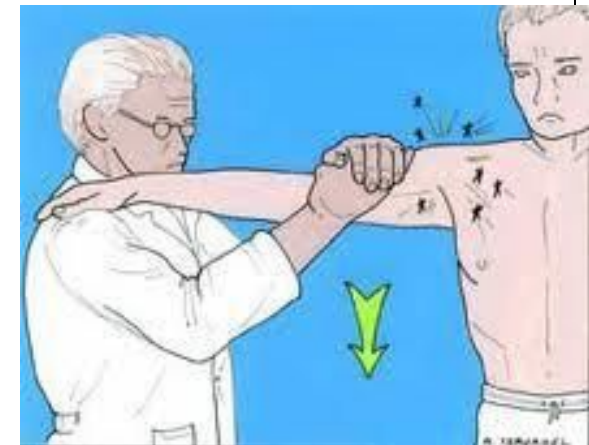
## Anterior Apprehension Test 1

- The most common location for GH Instability is Anterior and Inferior
- How the test is done
  - Client seated or supine, shoulder abducted to 90, elbow flexed 90
  - Examiner applies a GENTLE Posterior to anterior pressure over the humerus
  - Observe Client for signs of apprehension or pain
- Positive Result – Client apprehension, Excessive anterior translation or hopefully not but dislocation are all signs of a positive test for ANTERIOR GH INSTABILITY



# Feagin's Test

- How the test is done
  - Client is seated, examiner stands at their side and places the Client's arm on your shoulder (approx 90°)
  - Interlock your fingers together and place your palms over the head of the humerus
  - If they allow apply an inferior pressure to the head of the humerus
- Positive Result – Apprehension of face of Client, Clunk or excessive inferior translation when compared bilaterally, are all signs for GH INFERIOR INSTABILITY
- Local pain – Rotator cuff ligament/
  - tendon damage



# Sulcus sign TEST

- Tests for INFERIOR GH INSTABILITY
- How the test is done
  - Pt stands, arm hanging at side, examiner applies long axis distraction to the humerus
- Positive Result – Increase inferior ROM or apprehension = Inferior Instability

# Load and Shift

- Checks Anterior and Posterior instability of the GH
- How the test is done
  - Client supine, prone, or seated with shoulder near neutral, examiner applies pressure over humerus to create a load over the GH joint while stabilizing the shoulder, examiner then moves the shoulder anterior, posterior & inferior
- Results – Excessive translation ( should be  $\leq 25\%$  anterior or  $\leq 50$  posterior) = shoulder instability or labral tear, or Bankart lesion (injury of the anterior (inferior) glenoid labrum)

<https://www.youtube.com/watch?v=txARar71h5E>



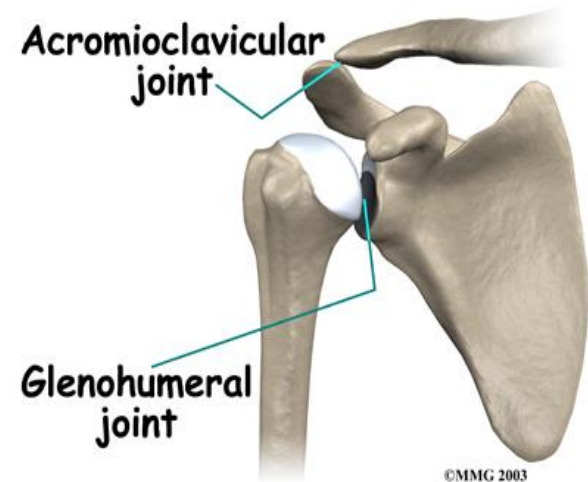


# Other special tests for GH Instability

- Anterior Instability tests
  - Relocation test
  - Release maneuver
- Posterior Instability tests
  - Norwoods Posterior drawer test

# AC Joint Sprain or Separation (AC Joint Pathology)

- Damage or tearing of the ligaments or joint capsule of the AC joint, AC separation is the displacement of the AC joint from its usual position



# How it happens?

- Cause (mechanism of injury 1)
  - Direct force to the superior aspect of the acromion, generally the arm is in an adducted position, pushes the acromion inferiorly which causes a sprain of the intra-articular acromionclavicular ligaments
- Cause #2
  - Fall on an outstretched hand, causes an indirect force up the arm, through humeral head to acromion, displacing it superiorly and causing stress to the AC joint

# Grade of Injury

- Type 1
  - Local to AC capsule or coracoclavicular ligaments
  - Mild trapezius and levator myospasm
  - No visible displacement seen on a x-ray
- Type 2
  - AC Capsule & coracoclavicular ligaments
  - AC & Coracoid Tenderness
  - Noticeable trapezius and Levator myospasms
  - Visible clavicle elevation (less than a grade 3)
  - X-ray + clavicle elevation
  - $\frac{1}{2}$  an inch of distal clavicle (4-5mm of joint space)

# Grade of Injury Continued

- Type 3
  - Major AC & Coracoclavicular ligament involvement
  - Extreme Pain over AC & Coracoid tenderness
  - Easily visible displacement
  - Possible swelling

# History

- Trauma as indicated in causes of injury
  - Impact
  - Fall on outstretched hand
  - Heavy lifting



# Observation

- Visible Step defect. You will notice a prominent lateral clavicle and the normal shoulder contour generally is indicative of ligament disruption.



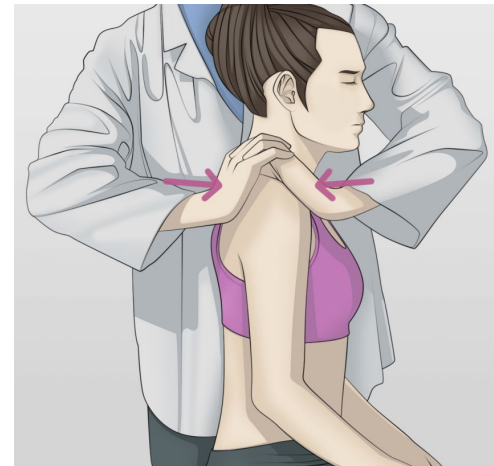
# Palpation & Movement

- Palpation
  - Pain & Tenderness over AC joint
  - Myospasm of trapezius, subclavius, deltoid & pectoralis
- Motion
  - AROM & PROM – increased pain visible at 90° of Abduction (This puts the AC joint close pack position)
  - Endfeel possible empty (pain stops movement)
  - RROM may be normal if decreased likely due to pain



# Special Tests – AC Shear Test

- How is the test done?
  - Client seated, examiner cups hands over clavicle & spine of scapula, then applies a compressive force
- Result – Positive result is abnormal movement. This equals AC joint pathology



# Coracoclavicular Ligament Test

- How its done?
  - Patient side lying Position on unaffected side hand resting on lower back
  - Examiner stabilizes clavicle while pulling inferior angle of the scapula away from the chest wall(Conoid portion). To test the trapezoid portion the client position remain the same, the therapist stabilizes the clavicle and pulls the medial border of the scapula away from the chest wall
- Positive sign – pain under the clavicle between the outer 1/3 and inner 2/3 is a positive sign a ligament pathology

# Rotator cuff Strain/tear

- What is it?
  - Stretch/tear of rotator cuff tendon or muscle. Grade is dependant on amount of fibers damaged, degree of pain and strength of muscle contractions
- How does it happen?
  - Degenerative strain – occurs with minimal trauma, usually happens before chronic tendonitis, or chronic impingement syndrome
  - Acute traumatic strain – Fall on outstretched hand, single violent blow/force to the shoulder
  - Repetitive overuse of muscles in a short period of time
  - Lifting or pulling
  - Pre existing impingement syndrome

# History

- Pain located over the superior lateral shoulder
- Pain that becomes worse when leaning on the elbow which causes an upward force on the shoulder
- Pain at night, especially while lying on it
- Unable to perform over the head activities for long periods of time if at all
- Feeling of tearing and or popping sound at the time of injury followed by pain and weakness
- Swelling, bruising and/or reddening in the shoulder, armpit and/or upper arm (in more severe cases)
- Weakness may present but usually pain is most persistent
- Cephalic may be present with motion

# Observations & Palpations

- Shoulder joints and soft tissues surface anatomy appear normal
  - Protective shoulder hike may be seen
  - If it is a chronic condition there may be muscle wasting in supraspinatus and infrapinatus fossa
- Palpation
  - Tenderness over rotator cuff muscles
  - Possible muscle spasm and MFTP in the rotator cuff muscles

# Movement

- Rotator Cuff Muscles – Supraspinatus, infraspinatus, Teres minor, Subscapularis
- AROM – Weakness or pain during adduction, external rotation, internal rotation or any combination of these actions based on which muscles that are damaged
- PROM – Pain if impingement occurs or pain at end range when muscle is stretched
- RROM – Pain and weakness in Abduction, lateral or medial rotation

# Special Tests – Apley’s Scratch Test

- How is the test done?
  - Client seated or standing
  - Examiner instructs Client to place hand behind back and touch middle of back and the opposite hand superiorly
  - Repeat with hands in the opposite position
- Results – Positive sign – Pain & Inability to perform motion. **Indicates-** Rotator cuff pathology (bicipital or supraspinatus tendinitis), external GH rotator tightness or pathology, labral pathology, AC arthritis, capsular/muscle contracture
- **Often less flexibility with the dominant arm in the test**
- <https://youtu.be/oORkZ2gLlbA>

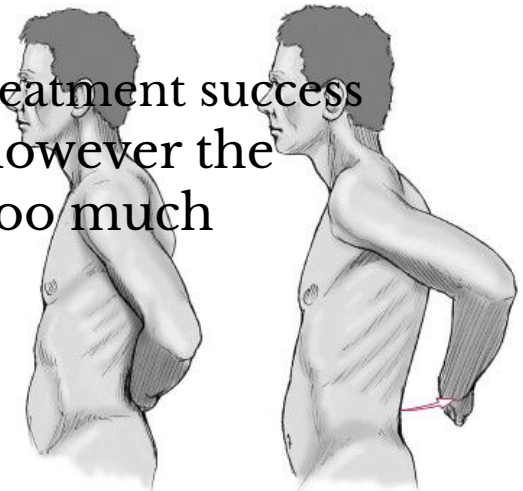
# Codman's Arm Drop Test

- How its done?
  - Patient is seated, examiner passively abducts shoulders 90° with solid support, then asks patient to slowly lower their arm.
  - Examiner should be ready to catch Clients arms in case it is too painful for the Client to overcome gravity
- Positive sign- if patient is unable to return the arm slowly to side or severe pain when attempting to do so.
- A positive result indicates a tear in the rotator cuff complex
  - A 3° strain is more common in older patients (50+)
  - A 1-2° strain is more likely to occur when the patient is abducting the arm and a strong downward, eccentric load is applied to the arm
- [https://youtu.be/ZhN1\\_ZJyUnk](https://youtu.be/ZhN1_ZJyUnk)



# Lift off sign

- How is it done?
  - Patient standing with dorsal surface of hand against sacral or lumbar spine
  - Examiner instructs patient to lift their hand off their back
  - Examiner observes motion
  - If patient is able to lift off with ease apply a slight resistance – ensure the motion from the patient is rotating the shoulder and NOT extending it. May need to stabilize at the elbow
- Positive result –
  - Inability to lift hand off of sacrum without resistance; lesion in subscapularis (abnormal motion of the scap during the test may indicate scap instability)
  - With resistance tests the strength of subscapularis; torn subscapularis tendon
- Things to keep in mind
  - Measure distance from Clients spine to evaluate treatment success
- This test is very specific to rule in Subscap tear, however the tear at least 70% for a positive result to occur if too much pressure is applied
- [https://youtu.be/AgkTH52\\_PBI](https://youtu.be/AgkTH52_PBI)

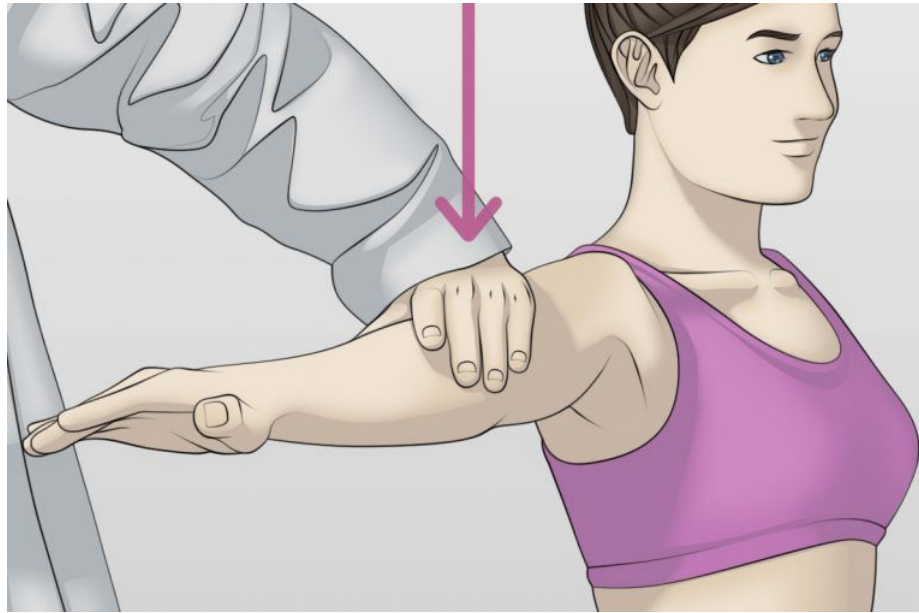


# Supraspinatus test (empty can full can, jobe's)

- How is it done?
  - Patient's arm abducted to 90° hands neutral, examiner applies a downward pressure as the pt. attempts to resist
  - Then have pt internally rotate their arm, thumb down, again the examiner applies a downward pressure
  - Lastly pt externally rotates arm, thumb up, again therapist applies a downward pressure
- Positive signs – pain or weakness or both **indicates** supraspinatus tendon/muscle tear, or neuropathy of the suprascapular nerve

More 

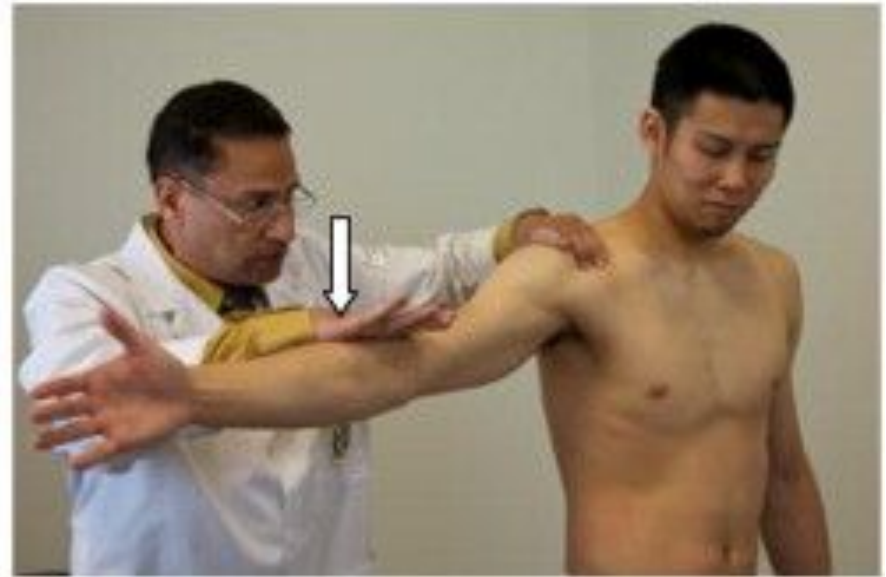
Step  
1



Step 2



Step 3



# Lateral Rotation Lag Sign

- How it is done?

- Patient is seated or in standing position, examiner stabilizes Client's elbow & wrist and passively places elbow at 90°, shoulder at 90° of abduction and laterally rotated to end range
- Examiner then externally rotates shoulder to near end range and instructs pt. to hold position then releases stabilization

- Results- Positive sign - Patient arm will medially rotate and spring back anteriorly

- Indicates – Infrapinatus and Suprapinatus tear



# Impingement Syndrome

- What is it?
  - Narrowed space between acromion and humeral head that results in pinching of the rotator cuff tendons (esp. supraspinatus and/or biceps brachii long head)
- How it happens??
  - Overhead activity, tendinopathy resulting from repeated episodes on inflammation, excessive repeated use heavy lifting, trophic changes in rotator cuff, biceps and adjacent bone which may lead to tendon ruptures
  - Risk factors - prior or repeated injury, overhead activities, GH instability, enlarged acromion or coracoid process

# Health History

- Dull achy shoulder pain, worse with shoulder abduction above 80°, over head activity or excessive use
- Sudden onset of sharp pain in shoulder with tearing suggests rotator cuff tear
- Gradual increase in shoulder pain with overhead activities suggests impingement
- Pain may be worse after sleep if arm was abducted overhead or sleeping on firm mattress

# Observations & Palpations

- Check for muscle atrophy, asymmetry, swelling, warmth and redness
- Palpation
  - Pain on top of shoulder – Ac joint arthritis
  - Pain over bicipital groove – Bicipital tendonitis
  - Lateral shoulder pain – Supraspinatus tendinopathy

# Movement

- Active ROM
  - Pain during Painful arc with shoulder abduction from 80 -120, shoulder hiking on affected side
  - During flexion pain from approx 80 -120
  - Other Active ROMS may be restricted above 120 degrees
- Passive ROM
  - Usually within normal limits UNLESS a tendon is compressed with passive actions



# Movement Continued

- RROM
  - Possible muscle weakness due to pain with muscles tests if there are co-existing tears or inflammation

# Neer's Impingement Test

- Indicates overuse injury to the supraspinatus muscle and sometimes the bicep tendon
- How is it done?
  - The patient's arm is passively and forcibly fully elevated in the scapular plane with the arm medially rotated by the examiner.
  - This passive stress causes the greater tuberosity to jam against the anteroinferior border of the acromion
- Positive-
  - The patient's face shows pain

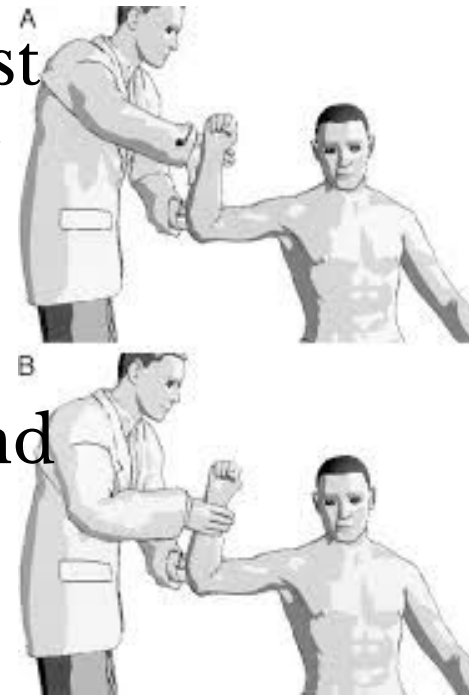


# Internal Rotation Resistance Strength Test (IRRST)

- Follow up to Neer's Test
  - Client standing, arm abducted to  $90^\circ$  and laterally rotated to  $80^\circ - 85^\circ$ . Examiner applies isometric resistance to lateral rotation and then medial rotation

## Positive Sign –

- Patient with a positive impingement test has good strength in lateral rotation but **NOT** medial rotation = internal impingement
- If patient exhibits more strength on medial rotation than lateral rotation = anterior impingement (sub acromial) and external-articular problem when the examiner has found neer's (+)



# Hawkins-Kennedy Impingement Test

## ● How is it done?

- Client seated shoulder abducted to 90, elbow flexed to 90
- Examiner forcibly medially rotates shoulder

## ● Results

- Positive sign – Pain in the anteriolateral shoulder **indicates** supraspinatus paratenonitis/tendinosis or secondary impingement

● Test is most accurate when clustered with painful arc and infraspinatus muscle strength test



# Painful Arc Test

- How it's Done?
  - Client standing, takes arm actively through abduction
- Positive signs – Pain occurring b/w 60 and 120 degrees = Subacromial bursa and rotator cuff tendons specifically supraspinatus being pinched between the humerus and the ac
- Pain in the last 10 – 20 degrees of motion indicates AC joint if local and Impingement if pain is in the anterior shoulder

# Bicipital Tendinopathy

- What is it?
  - Inflammation of biceps brachii long head tendon and surrounding sheath. Usually occurs with other shoulder dysfunctions. The musculotendinous joint is a very common location for repetitive or overuse injuries
- How it happens?
  - Subluxating Tendon – Rupture of Transverse humeral ligament or shallow intertubercle sulcus causing the tendon to repeatedly out of place
  - Vascular theory - tendon degeneration occurs as a result of vascular deficiencies

# Causes Continued

- Mechanical – repetitive loading of tendon results in microscopic degeneration, scar tissue
- Neural modulation – results from mediated mast cell degranulation & release of substance P

# History

- Pain over anterior shoulder and bicipital groove
- Worsens with activity especially the actions of shoulder and elbow flexion as well as supination, Also performing Over the head actions may increase pain
- Pain is reduced with heat, massage and rest
- Snapping/clicking audible with subluxation of tendon



# Observation & Palpation

- What you see?
  - Rarely mild swelling and/or redness
  - Client holds or rubs shoulder in an effort to reduce pain
- What you feel?
  - Tenderness over bicipital groove

# Movement

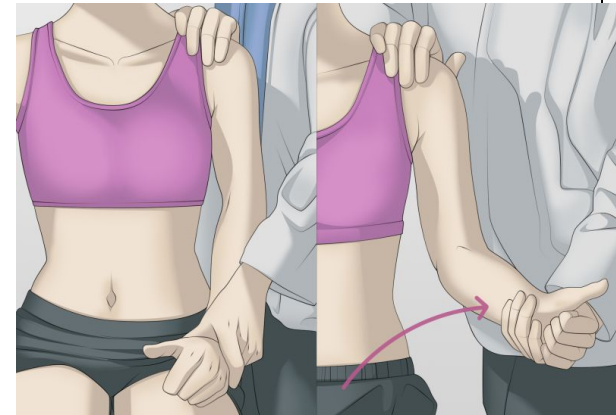
- AROM
  - Possible recreation of pain during shoulder/elbow flexion and supination
- PROM
  - Pain and end of motion where bicep tendon is stretched
- RROM
  - Pain with resisted shoulder & elbow flexion

# Special Tests – Speeds Test

- How it's done?
  - Client standing, arms forward flexed to 90° elbow straight, arm supinated (then repeat in pronation), Have client attempt to resist as therapist applies a downward force into extension
- Results
  - Positive sign –increased tenderness in the bicipital groove– **Indicates** bicipital tendinitis/ paratendonitis most specifically over the bicipital groove. Profound weakness on resisted supination a severe 2<sup>nd</sup> or 3<sup>rd</sup> degree rupture or strain of the distal biceps should be suspected

# Yergason's Test

- Mainly test for Transverse humeral ligament
- How its done?
  - Patients elbow flexed to 90°, stabilized against thorax and forearm pronated
  - Examiner resists supination while the patient also laterally rotates the arm against the same resistance.
- Results?
  - Positive sign – palpation of tendon slipping out of groove **indicates** torn transverse humeral ligament. Tenderness in bicipital groove alone may indicate bicipital paratenonitis/tendinosis
  - Not as effective as speed's



# Frozen Shoulder

- What is it? AKA Adhesive Capsulitis is a Idiopathic (Disease or condition that arises spontaneously or for which the cause is unknown)of the shoulder. The client has noticeable pain and contracture of the joint capsule with major reduction of ROM
- How does it happen? Not fully understood. The process of Frozen shoulder includes excessive type III collagen secretion that leads to soft tissue contractures of GH joint capsule

- Typically develops in 3 stages that may last for months to years
  - Painful stage – Pain occurs with movement and ROM starts becoming limited
  - Frozen Stage – Shoulder pain decreases however ROM significantly reduced or Frozen
  - Thawing Stage – Shoulder ROM begins to improve and return back to normal

# Health History

- Pain & Reduced ROM are classic symptoms
- May not have a prior injury or specific cause
- Gradual increase in pain and decrease in ROM
- May have had a previous injury or immobilized for a length of time
- Systemic disease such as diabetes or hyperthyroidism

# Observation and Palpation

- Observation
  - Shoulder surface appears normal, with the possibility of GH muscle wasting if condition has been on going for some time
- Palpation
  - Applying a direct pressure over the joint capsule is painful



# Movement

- AROM – Decrease in ROM, Cannot perform the over the head portion of Apley's Scratch
- PROM – Most specifically with External rotation and abduction Painful capsular end feel, followed by internal rotation and flexion
- RROM – May cause pain in rotator cuff muscles

# Special Tests

- Apley's Scratch (Superior portion)
- Arm drop test (indicate supraspinatus tear)
- Speeds Test (indicates biceps long head issue)

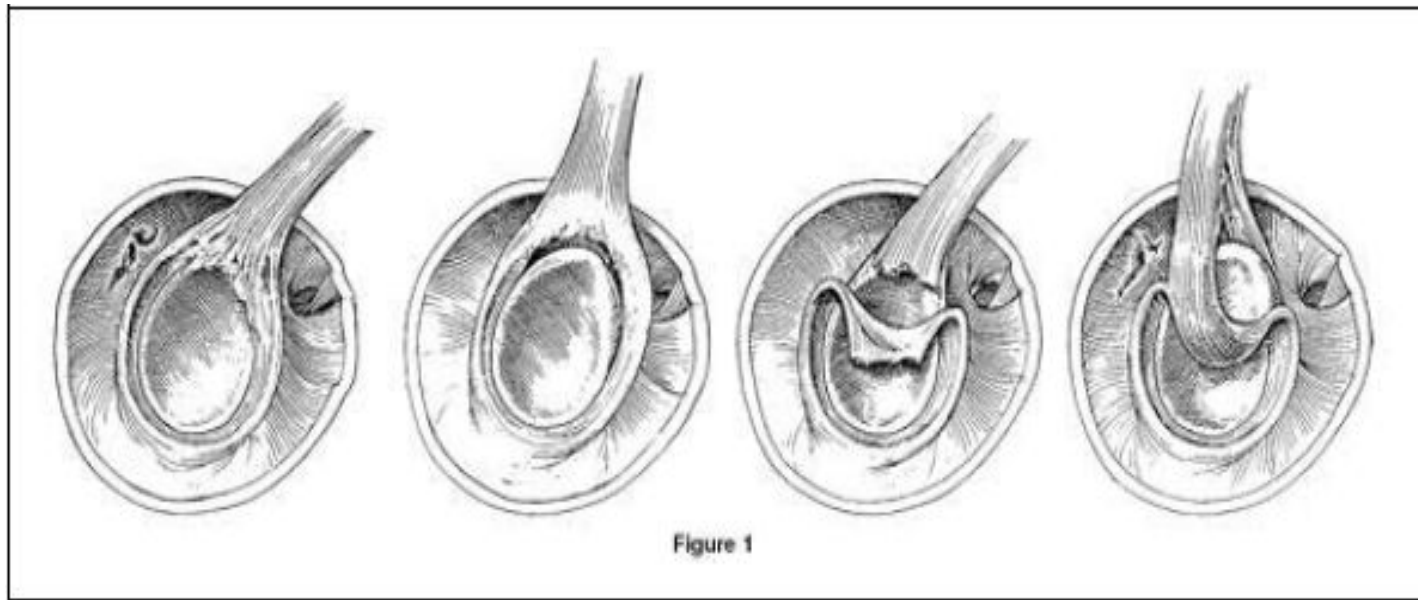
# Glenoid Labral Tear

- What is it?
  - Tearing or detachment of the fibrocartilaginous Labrum and insertion point of the biceps brachii long head. Can often be missed as the cause of long term chronic shoulder pain
- How does it happen?
  - SLAP lesion (Superior Labrum anterior and posterior) has 4 types

# Slap Lesion Types

- Type 1
  - Fraying of labrum, biceps anchor intact
- Type 2
  - Superior labral tear that creates biceps instability (MOST COMMON)
- Type 3
  - Bucket handle tear of superior labrum
- Type 4
  - Bucket handle tear, that expands to the bicep tendon

# Slap Lesion



# Bankhart and Bennett Lesions

- Bankhart Lesion
  - Less common, Tear of lower half of labrum and inferior glenohumeral ligament (often accompanies shoulder dislocations)
- Bennett Lesion
  - Least common type of labrum tear which can be associated with posterior rotator cuff damage

# Health History

- Pain with motions that are over the head or across the body
- Occasional pain at night
- Snapping, popping or CATCHING with motion
- Pain can occur with ADL
- Instability in the shoulder
- Decrease ROM and Strength
- Prior history or injury or trauma
- client may have seen other health care practitioners and have not had any success improving the condition

# Observation & Palpation

- Observation
  - client may show signs of being protective
  - May hold arm in a sling position
- Palpation
  - Tenderness around bicipital tendon, anterior deltoid and supraspinatus insertion
  - Possible inflammation or edema with warmth



# Movement

- AROM
  - Pain, crepitis and reduced ROM over the head
- PROM
  - Possible reduction of ROM due to pain, myospasm End feel
  - Muscle guarding or apprehension
- RROM
  - Weakness due to pain of biceps

# Special Test

- O'brien's Compression Test
- Hawkins Kennedy test
- Labral Crank (Crank) Test
  
- Other special test includes Biceps load test II

# Active Compression Test of O'breins

- How is it done?
  - Two part test, patient standing, shoulder flexed to 90°, arm Adducted to 10 -15°
  - The examiner will push down on pt arm while pt attempts to maintain position in both parts of the test
- Part #1
  - Arm internally rotated (Thumbs down)
- Part #2
  - Arm & hand externally rotated (Palms up)
- Results – Designed to detect a type II SLAP Lesion
- Pain on the joint line OR INTERNAL painful clicking of the shoulder joint (Not ACJ) in the first part of the test and eliminated in the second test is considered positive for labral abnormalities

# Continued

- Results – Designed to detect a type II SLAP Lesion
- Pain on the joint line OR INTERNAL painful clicking of the shoulder joint (Not ACJ) in the first part of the test and eliminated in the second test is considered positive for labral abnormalities

# Labral Crank Test

- How its done?
  - Patient is seated or supine shoulder abducted to  $160^{\circ}$  in the scapular plane and elbow flexed to  $90^{\circ}$
  - Examiner applies long axis compression as well as rotating the humerus internally and externally
- Results? Positive sign – Shoulder pain on rotation (especially lateral) with or without clicking **indicates** - Glenoid Labral tears

# Thoracic Outlet Syndrome (TOS)

- What is it? A general term for a condition that results in compression of the neurovascular structures at the thoracic outlet (between your clavicle and first rib). These structures include the Brachial plexus, subclavian nerve and artery. This will cause symptoms in the upper extremities, neck and chest. We often see TOS over diagnosed so try to determine the cause if dealing with its symptoms

# How does it happen?

- Three main causes
  - Vascular – This is rare but would include subclavian vein or artery compression or thrombosis (blood clots)
  - Nonspecific – This one is much more common – client has symptoms but no abnormal nerve conduction present or abnormal angiography tests
  - Neurologic – Brachial plexus compression (C5 – T1)

# Risk Factors

- There are some factors that can make people more susceptible to this condition. Those include
  - POSTURE (rounded shoulder, forward head, Tight scalenes, LS, Subscap and pectoralis minor)
  - Large breasts and gravity
  - Asthma or emphysema – Breathing patterns
  - Elevated upper ribs, cervical rib long TP of C7
  - Trauma or injury (Whiplash, clavicle or first rib fracture, humeral dislocations, inflammation or scar tissue)
  - Anatomical variations
  - Sleeping in an arm over head position



# Health History

- Gradual onset of numbness, tingling and pain of upper limb or constant ache with paresthesia (burning or pricking feeling)
- Pain down medial arm and hand
- Neck pain and headaches
- Prior history of cervical trauma
- Repetitive activities – desk work, throwing activities
- Worse with hyperabduction better with rest

# Observation & Palpation

- Observation
  - Posture – Rounded shoulders, forward head placement
  - Hypertrophic SCM or Scalene muscles
- Palpation
  - Tenderness over scalenes, brachial plexus and lower cervical spine, above clavicle
  - Hypertonic scalenes or pec minor

# Movement

- AROM & PROM may be limited due to pain or numbness and tingling
- RROM – May show muscle weakness depending on level of involvement

# Neurovascular signs

- Muscle weakness with shoulder Abduction and grip strength
- Deep tendon reflexes generally normal
- Hyperesthesia or hypoesthesia over C8 – T1 dermatomes (most common) rarely C5 – C7
- Possible decreased, irregular or absent pulse with tests involving shoulder abduction
- Advanced changes may include Raynauds phenomenon, glossy skin, coldness and cyanosis (rare)

# Special Tests – Roo's

Also known as EAST or Elevation arm stress test.

- How is it done?
  - Patient stands shoulders at 90° abducted, laterally rotate s the shoulder and elbows flexed to 90
  - Examiner instructs client to open and close fists slowly, 2x per second for three minutes (one minute may be long enough)
- Results – Positive sign – Inability to maintain action with associated tingling or weakness **indicates- Thoracic Outlet Syndrome**

# Adson's Test

- How is it done?
  - Patient seated
  - Examiner palpates radial pulse
  - Patient rotates head to test side
  - Patient then extends head as the examiner laterally rotates and extends the Pt shoulder
  - Instruct Pt to take a deep breath and hold it
- Results – Positive sign – Decrease/loss of pulse **indicates** neurovascular compression (TOS)
- Test shows false positive in 42% of people with carpal tunnel and 9 -20% of general population

# Costoclavicular Maneuver

- Also known as Eden's Test or Military Brace Test
- How its done?
  - Patient seated
  - Examiner palpates radial pulse and then pulls shoulder down and back
- Positive- absence of pulse and implies possible TOS

# Wright's Test

- How is done?
  - Patient seated
  - Examiner palpates radial pulse, then abducts client's arm above head
  - Repeat on opposite side
- A variation of this test is that is done horizontally abducting arm at 90 degrees and elbow at 90
- Result – Positive sign – Change in radial pulse or numbness and tingling **Indicates** TOS secondary to compression under pectoralis minor muscle
- It is normal finding for the pulse to change when arm is held over the head
- Video [https://youtu.be/L6BoVyE\\_vfE](https://youtu.be/L6BoVyE_vfE)



# UPPER LIMB TENSION TESTS

ULLT 1 - 4

# Peripheral nerve Injuries in the Shoulder

- Individual nerves are susceptible to injury in the shoulder area, but remember these nerves can also be damaged as part of the Brachial plexus so TOS should be considered when looking at nerve symptoms

# Axillary nerve (C5 – C6)

- Most commonly injured nerve in the shoulder
- Most common cause anterior dislocation or fracture of the neck of the humerus
- May injure during dislocation or relocation
- Other factor such as compression (crutches), brachial plexus injuries, quadrilateral space entrapment or shoulder surgery

# Continued

- Motor loss
  - inability to purely abduct arm; a trick movement includes laterally rotating and abducting using long head of biceps to accommodate this movement
  - Some may be asymptomatic but demonstrate early fatigue
  - Weakness of lateral rotation
  - Loss of lateral roundness of the shoulder
- Sensory Loss
  - Over the deltoid with the main loss being a small 2-3 cm circular area at the deltoid insertion

# Suprascapular Nerve (C5 – C6)

- May be injured by fall on posterior shoulder, stretching, repeated microtrauma, or fracture of the scapula
- Commonly injured as it passes through suprascapular notch or as it winds around the spine of the scapula
- Often hard to differentiate from rotator cuff tears so patient history and MOI become important
- Common in people who work overhead
- Symptoms include persistent rear shoulder pain, paralysis of supraspinatus muscle and infraspinatus leading to weakness in abduction and lateral rotation, wasting in muscles over the scapula

# Musculocutaneous Nerve (C5 – C6)

- Not commonly injured, if so generally caused by humeral dislocation or fracture or together with brachial plexus injury or axillary artery injury
- Motor loss – primarily loss of elbow flexion, shoulder flexion and some loss of supination
- Sensory loss – Antebrachial cutaneous nerve (branch of musculocutaneous) alters sensation in lateral aspect of the forearm.
- If this branch is compressed under the distal biceps tendon results in Musculocutaneous Nerve Tunnel Syndrome resulting in sensory loss in the forearm

# Long Thoracic Nerve (C5 – C8)

- Not commonly injured – can be caused by repeated microtrauma causes by heavy effort above shoulder height, pressure on nerve from back packing, vigorous upper limb activity
- Motor Loss – paralysis of the serratus anterior causing winging of the scapula, making abduction over 90 degrees difficult

# Spinal Accessory Nerve (C3 – C4)

- Vulnerable to traumatic injury



# Upper Limb Tension Tests

- The Upper Limb Tension Tests (ULTTs) are also known as Brachial Plexus Tension or Elvey Test.<sup>1</sup> These tests are designed to put stress on neurological structures of upper limb. These tests were first described by Elvey<sup>1</sup> and hence also known as Elvey test but most commonly called ULTT. The shoulder, elbow, forearm, wrist and fingers are kept in specific position to put stress on particular nerve (nerve bias) and further modification in position of each joint is done as "sensitizer". The ULTT's are equivalent to the straight leg raise designed for the lumbar spine.

[http://www.physio-pedia.com/Neurodynamic\\_Assessment](http://www.physio-pedia.com/Neurodynamic_Assessment)

- These tension tests are performed to check the peripheral nerve compression or as a part of neurodynamic assessment. The main reason for using a ULTT is to check cervical radiculopathy. These tests are both diagnostic and therapeutic. Once the diagnosis of cervical radiculopathy is made the tests are done to mobilise the entrapped nerve

[http://www.physio-pedia.com/Neurodynamic\\_Assessment](http://www.physio-pedia.com/Neurodynamic_Assessment)

- Each test is done on the normal/asymptomatic side first. Traditionally for the upper limb, the order of joint positioning is shoulder followed by forearm, wrist, fingers, and lastly elbow. Each joint positioning component is added until the pain is provoked or symptoms are reproduced. To further sensitize the upper limb tests, side flexion of cervical spine can be added. If pain is provoked in the very initial position, then there is no need to add further sensitizers.
- If pain or sensations of tingling or numbness are experienced at any stage during movement into the test position or during addition of sensitization maneuvers, particularly reproduction of neck, shoulder or arm symptoms, the test is positive; this confirms a degree of mechanical interference affecting neural structures.

[http://www.physio-pedia.com/Neurodynamic\\_Assessment](http://www.physio-pedia.com/Neurodynamic_Assessment)

# Upper Limb Tension Test 1

- How it's Done?
  - Client Supine side to be tested at the edge of the table
  - Examiner applies a depressive force to clients shoulder
  - With other hand grasp client wrist and abduct to 110, Flex the elbow to 90
  - Extend arm 10 degrees and externally rotate 60 degrees
  - Slowly extend their wrist and hand
  - Fully supinate their forearm and slowly extend their elbow
  - If symptoms occur slighty flex elbow and have them laterally flex head away from tested limb to confirm nerve root compression
  - Result – Positive sign – Recreation of their shoulder or arm pain **Indicates** – C5,C6,C7 nerve roots and median nerve are the source of clients shoulder/arm pain

# Upper Limb Tension Test II

- How is it done?
  - Client is supine, affected side on the edge of the table
  - Examiner applies depressive force to affected shoulder (hand or hip)
  - Grasp clients wrist and abduct the arm 10 degrees, flex the elbow to 90
  - Slowly extend wrist and fingers
  - Fully supinate and extend their forearm
  - If pain recreates flex the elbow a little and have them laterally flex the head away from the tested arm
  - Results – Postive Test - Recreation of shoulder and arm pain **Indicates-** Median nerve, musculocutaneous nerve, axillary nerve as the source of clients arm/shoulder pain

# Upper Limb Tension Test III

- How it is done?
  - Client Supine with affected shoulder on the edge of the table
  - Examiner applies a depressive force into the shoulder
  - Abduct clients arm to 110 degrees, flex elbow to 90
  - Slowly flex the wrist and fingers and ulnar deviate
  - Fully pronate and slowly extend their elbow
  - Results – Positive Sign – Recreation of shoulder/arm pain **Indicates** – The Radial nerve as the source of clients pain

# Upper Limb Tension Test IV

- How its done?
  - Client Supine with affected shoulder on the edge of the table
  - Examiner applies a depressive force into the shoulder
  - Hold clients wrist and abduct to 90, laterally rotate to 60
  - Slowly extend wrist and fingers then deviate to the radial side
  - Slowly flex and pronate forearm
  - Bring fingers to ear
- Results – Positive sign – Recreation of client shoulder/arm pain **Indicates – Ulnar nerve, C8 and T1 nerve roots as the source of the clients pain**
- Video <https://youtu.be/rir6x6Iiqc4>

# Muscle Strength Test



# Upper Trapezius Strength Test

- How is it done?
  - Client seated arms slightly abducted
  - Client attempts to elevate the shoulder against the examiners non yielding resistance
  - Compare bilaterally

# Mid Trapezius Strength Test

- How it is done?
  - Client is prone. Arm abducted 90, laterally rotated
  - Resist lateral rotation

# Lower Trapezius

- Client prone, arm ABD to 135 and laterally rotated, therapist applies a downward force at the clients wrist while they resist

# Rhomboid Strength Test

- How its done?
  - Client is prone with the tested arm across their back and their hand over their opposite back pocket
  - Examiner Stands beside test shoulder, and places fingers on the medial border of the scapula, then places the other hand on the anterior of the shoulder
  - Have the client push the shoulder anteriorly into that hand (relaxes Trapezius) in order to allow the fingers on the medial border to slide more under the scapula
  - Then instruct client to attempt to lift the tested arm off of the back pocket
- Postive Sign - IF The Rhomboid is functioning normally, they will push the examiners fingers out or away from the medial scapula or they will feel the rhomboids contract. If neither of these responses occur then that is considered a **POSITIVE RESULT**

# Tere's Minor/Infraspinatus strength

Client seated, arm abducted to 90, elbow flexed to 80, therapist applies in external rotation while client resists

# Serratus Anterior (Wall push Test)

- Client standing, pushes against a wall – therapist observes for winging scapula
- Winging indicates long thoracic nerve dysfunction

# Latissimus Dorsi Strength Test

- Client standing, arm flexed to 90, move into scaption, therapist palpates Lat muscle and resist the client extending and medial rotation

# Subscapularis strength

- Perform Lift Off Sign and resist it.



# Muscle length Tests

# Pectoralis Major Length Test

- How its done? client is supine, passively abduct arm to 90 and the apply horizontal abduction in an attempt to have the arm touch the table. This tests the clavicular portion
- Repeat at approximately 135 degrees this will test the sternal portion
- Positive sign for shortness – Arm is unable to go below the table during the horizontal abduction portion of the test
- <https://youtu.be/7MJnyd9-XgA>

# Pectoralis Minor Length Test

- The client rests in hook lying with the arms by the side and the palms facing up. The therapist measures the distance from the anterior tip of the acromion to the table and compares side to side.. The therapist then stands to the side of the client, crosses his arms, and places the heel of each hand on the client's coracoid processes. The arm crossing ensures that the line of force is directed posterior lateral. The therapist applies the force to each coracoid process and assesses the amount of excursion and type of end feel of each.
- Positive Sign – decreased posterior excursion

# Bicep Brachii Length Test

- Client supine, stabilize arm and take client into full elbow extension while supinated over the table

# Tricep Brachii Length test

- Client standing or seated, arms fully flexed, then have client flex the elbow

# Referred Pain in the shoulder

# Shoulder Muscles and Referral of Pain

- Levator Scapulae - Over muscle to posterior shoulder and along medial border of the scapula
- Latissimus Dorsi – Inferior angle of scapula up to posterior and anterior shoulder into posterior arm, may refer to area above iliac crest
- Rhomboids – Medial border of scapula

## continued

- Supraspinatus Over shoulder cap and spine of scapula, sometimes down lateral aspect of arm to proximal forearm
- Infraspinatus – anteriolateral shoulder and medial border of scapula, may refer down lateral aspect of the arm
- Teres Minor – Near deltoid insertion, up to shoulder cap, and down lateral arm to elbow



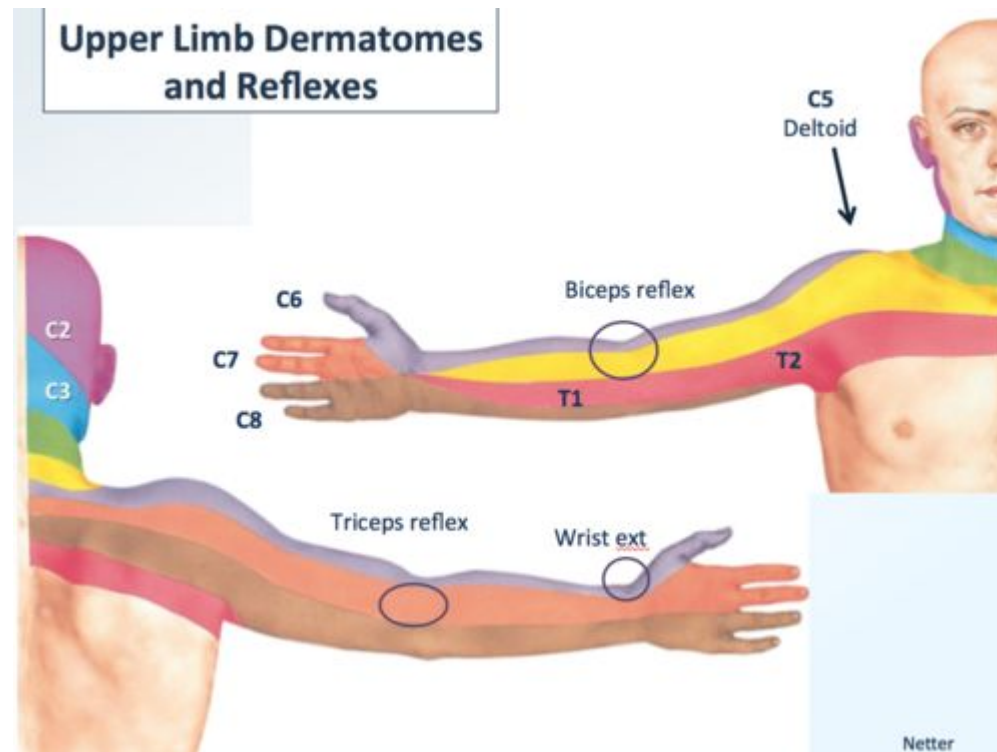
# Continued

- Subscapularis – Posterior shoulder to scapula and down posteriomedial and anteromedial aspect of arm to elbow
- Teres Major – shoulder cap down lateral aspect of the arm to the elbow
- Deltoid-over muscle and posterior glenoid area of the shoulder
- Coracobrachialis – Anterior shoulder and down posterior arm

# Dermatomes and Relfexes

# Dermatomes

- <https://www.youtube.com/watch?v=VlPpdRTGH-o>



# Group read

- Reflexes and cutaneous distribution including peripheral nerve injuries page 346-350

# Shoulder Joint Play

- Joint play movements are usually done with the Pt Supine
- Compare sides bilaterally, unaffected side first

# Backward Glide of the Humerus

- Examiner grasps the pt's upper limb, place one hand over the anterior humeral head.
- The other hand is placed around the humerus above and near the elbow while the patient's hand is held against the examiners thorax by examiner's arm
- Examiner applies a backward force, keeping the pt's arm parallel to the body (no rotation or torsion)

# Forward Glide of the Humerus

- Examiner grasps the pt's upper limb, is placed around the medial humerus distal to the GH while the patient's hand is held against the examiners thorax by examiner's arm
- Use the other hand to stabilize the ACJ
- Examiner applies a anterior force, keeping the pt's arm parallel to the body (no rotation or torsion)



# Lateral Distraction of the Humerus

- Examiner grasps the pt's upper limb, place one hand in the axilla.
- The other hand is placed around the humerus above and near the elbow while the patient's hand is held against the examiners thorax by examiner's arm
- Examiner applies a lateral distraction force, keeping the pt's arm parallel to the body (no rotation or torsion)
- The examiner must be careful to apply the lateral distraction force with the lateral of the hand

# Caudal Glide of the Humerus

- AKA long axis traction
- Examiner grasps above the pt's wrist with one hand and palpates with the other hand, below the distal spine of scap posteriorly and below the distal clavicle anteriorly over the GH joint line.
- Examiner applies a traction force to the shoulder while palpating to see whether the head of the humerus drops down (moves distally)
- If pt complains of pain in the elbow, test may be done with hand above elbow (instead of wrist)

- <https://www.youtube.com/watch?v=hKjQw-blrZ4>

# Backward Glide of the Humerus in Abduction

- Examiner abducts the pt's arm to 90°, place one hand over the anterior humerus while stabilizing the pt's hand against examiners thorax.
- A backwards force is then applied, keeping the patient's arm parallel to the body

# Lateral Distraction of the Humerus in Abduction

- Examiner grasps above the pt's wrist with one hand, stabilizing the pt' thorax with the other hand
- Abduct the Pt's arm to 90° abduction
- Examiner applies a traction force to the shoulder
- If pt complains of pain in the elbow, test may be done with hand above elbow (instead of wrist)

# Anteroposterior and cephalocaudal movements of clavicle at ACJ

- Examiner gently palpates the clavicle close to the AC joint.
- Move clavicle in and out
- Or up or down
- The bone lies just under the skin so these techniques are usually uncomfortable. Warn pt about this prior to.
- Care should be taken not to squeeze the clavicle, this may cause pain.

# Anteroposterior and cephalocaudal movements of clavicle at sternoclavicular joint

- Examiner gently palpates the clavicle close to the sternoclavicular joint.
- Move clavicle in and out
- Or up or down
- The bone lies just under the skin so these techniques are usually uncomfortable. Warn pt about this prior to.
- Care should be taken not to squeeze the clavicle, this may cause pain.

# General movements of Scapula

- Pt lies on one side to stabilize the thorax with top arm relaxed and resting behind the low back (tests uppermost scap movements)
- Examiner faces the pt, placing the lower hand along the medial border of the pt scap
- Examiners other hand holds the upper dorsal surface of the pt scap
- Ask pt to relax against examiners body allowing the scap to relax
- Examiner uses their body to push the shoulder posteriorly allowing examiner to get a better grip of the scap
- Move the scap in the following motions;
  - Medially, laterally, caudally, cranially, and away from the thorax



# Ribs

- This is just a general rib joint play
- The examiner applies anterior rib springing using the side of the thenar eminence of the hand
- Pressing down several times
- Compare bilaterally

# Thoracic Spine

- Will be covered with the thoracic spine assessment