

Shoulder Injuries

The shoulder is a complex set of joints that act together to provide movement. They sacrifice stability to achieve maximum mobility.

The complex is made up of four joints:

- (i) Sternoclavicular joint
- (ii) Acromioclavicular joint
- (iii) Glenohumeral joint
- (iv) Scapulothoracic joint

Sternoclavicular joint

Common injury is dislocation which may occur anteriorly or posteriorly and consists mainly of soft tissue damage as opposed to fracture.

Anterior Dislocation

- Recognised by the anterior prominence of the clavicle, which may be initially distressing.



Anterior Dislocation

- The symptoms usually subside rapidly and treatment varies from a sling alone to surgery.
- Closed reduction provides good results but maintaining the reduction is difficult.



Posterior Dislocation

- ❑ Less common but has a higher risk of morbidity due to the potential damage to the great vessels, oesophagus or trachea.
- ❑ Presenting symptoms vary from mild to moderate pain, hoarseness, difficulty in swallowing or respiratory distress.
- ❑ Closed reduction is normally successful and stable.

Acromioclavicular Joint

- ❑ Sprains vary in severity depending on the extent of the injury to the stabilising ligaments and capsule.

Acromioclavicular Joint

- ❑ A second degree injury consists of a complete tear of the A/C ligament with the coracoclavicular ligament remaining intact.
- ❑ There may also be some degree of displacement or subluxation.

Acromioclavicular Joint

- ❑ A third degree injury consists of a total rupture of both the A/C ligament and the coracoclavicular ligaments.
- ❑ The resulting displacement is often obvious and confirmed by radiograph.

AC Separation

- ❑ The clavicle, because it is attached to the rib cage, cannot move down enough to follow the motion of the scapula.
- ❑ Something has to give, and the ligaments around the acromioclavicular (AC) joint begin to tear - separating, or dislocating, the joint.

Shoulder (AC) Separation



AC Separation

- ❑ The most common cause of an acromioclavicular (AC) joint separation is a fall on the shoulder (NHL player checked into the boards).
- ❑ As the shoulder strikes the ground, the force from the fall pushes the scapula down.

Shoulder Separation



Shoulder Separation

- ❑ A 'shoulder separation' is a fairly common injury, especially in an athletic population.
- ❑ A true 'shoulder separation' is a complete dislocation of the acromioclavicular (AC) joint.
- ❑ May be mistaken for a shoulder dislocation, and vice versa.



Grades of Shoulder Separation



Grade 3 AC Separation



Shoulder Separation



Shoulder Separation: Symptoms

- Ache with overhead and cross-body activity
- Popping and clicking
- Rotator cuff tendonitis
- Trouble sleeping



Shoulder Separation: Types

- Type I
A sprain (without a complete tear) of either of the ligaments holding the joint together.
- Type II
A tear of the **acromioclavicular** ligament.
- Type III
A tear of the acromioclavicular and **coracoclavicular** ligaments.
- Type IV
Both ligaments are torn, and the clavicle is pushed forward and sideways into soft tissue.

Management of A/C Injuries

- First and second degree sprains can be managed with a sling and 2-4 weeks rest until pain dissipates.
- This is followed by a rehabilitation program to restore normal upper limb motion and strength.

Management of A/C Injuries

- Third degree sprains are either treated in open reduction or closed conservative methods.
- Pain initially limits ROM and strength. Prior to return to activity patients should have a full pain free ROM and no pain on direct palpation of the A/C joint.

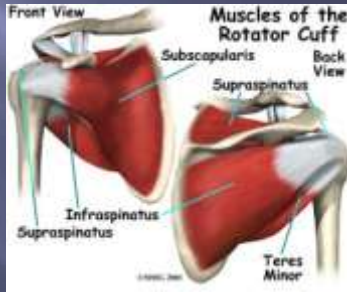
GLENOHUMERAL JOINT

Glenohumeral Joint

- Injuries to the Glenohumeral joint region consist of:
 - **Muscular injuries** - rotator cuff, biceps tendon, triceps tendon, latissimus dorsi and pectoralis major injuries
 - **Bursal injuries** - impingement syndromes
 - **Joint injuries** - dislocations (ant and post), labrum
 - **Capsulitis** - 'frozen shoulder'

Rotator Cuff

- ❑ Subscapularis
- ❑ Supraspinatus
- ❑ Infraspinatus
- ❑ Teres minor



Movement of RC Muscles

- ❑ Subscapularis is an internal rotator of the arm.
- ❑ Supraspinatus assists the deltoid in abducting the arm, with its greatest contribution being the initiation of abduction.
- ❑ Infraspinatus and teres minor muscles both externally rotate the arm.



Throwing Injuries

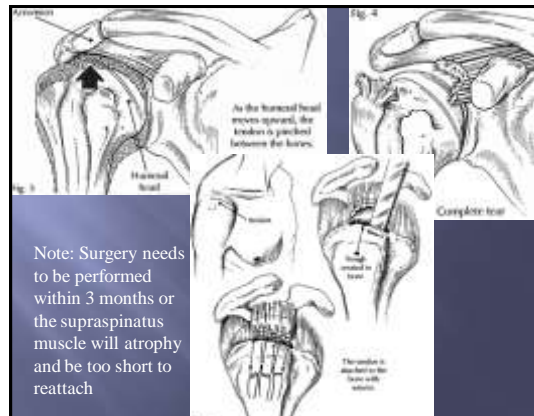


Rotator Cuff Injury - Throwing Injuries

- ❑ The throwing motion has been divided into five phases: wind-up, cocking, acceleration, and follow-through.
- ❑ **Cocking phase**
 - **Supraspinatus, Infraspinatus, and Teres Minor** muscles begin to fire at the end of early cocking phase.
 - **Subscapularis** subsequently fires in late cocking to decelerate the shoulder's external rotation. Also, it is stretching during the cocking phase.

Rotator Cuff Injury

- ❑ **Follow-through** (muscles fire most intensely)
 - **Subscapularis** internally rotates the shoulder,
 - Remaining rotator cuff muscles are contracting eccentrically to decelerate the arm and are stretched.
- ❑ During this repetitive eccentric loading, the rotator cuff is prone to overload, fatigue, tendinitis, and even a partial undersurface tear.



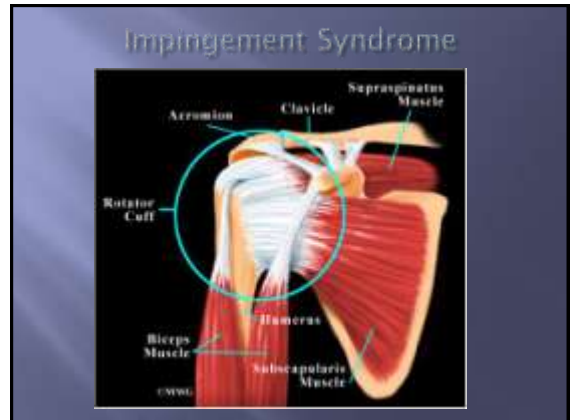


Rotator Cuff Injuries

- ❑ **Impingement** - prolonged, repetitive overhead activities may cause impingement of the rotator cuff on the acromion and overlying coracoacromial ligament.


Rotator Cuff Injuries

- ❑ Repeated movements may cause microtrauma to the cuff resulting in local inflammation, oedema, pain and poor function. These problems precipitate to further impingement causing a cycle of injury to be set up.



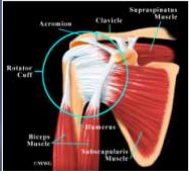
Impingement Syndrome

- ❑ The supraspinatus tendon connects the humerus with the scapula (shoulder blade) and helps **raise** and rotate the arm.
- ❑ As the arm is raised, the supraspinatus tendon also keeps the humerus tightly in the socket (glenoid) of the scapula.

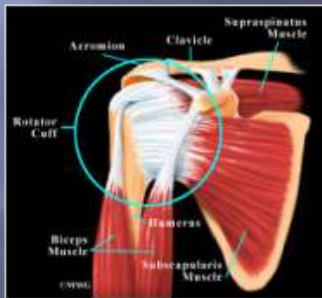


Impingement Syndrome

- ❑ The part of the scapula that makes up the roof of the shoulder is called the **acromion process**.
- ❑ Between the acromion process and the supraspinatus tendon there is a bursa.
- ❑ The **bursa** is a lubricated sac of tissue that protects the muscles and tendons as they move against one another.
- ❑ The bursa simply allows the moving parts to slide against one another without too much friction.

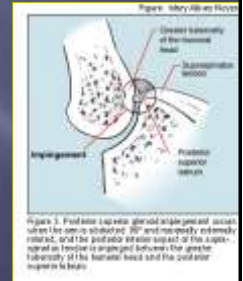


Impingement Syndrome

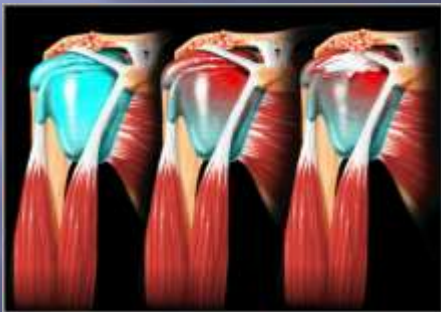


Impingement Syndrome

- If any condition decreases the amount of space between the acromion and the supraspinatus tendon, the impingement process may get worse.
 - Swelling
 - Bone spurs
 - Anatomical structure



Impingement Syndrome



Signs and Symptoms

- Increased pain on external rotation and abduction.
- Weakness and pain on manual muscle testing.
- Should be done in the 'empty can' position **abduction and internal rotation** as well as abduction with external rotation with the elbow at 0° and 90°.

Signs and Symptoms

- Passively, horizontal adduction, flexion and internal rotation cause pain.

Treatment

- Hot/cold "contrast baths", Pulsed U/S, DTF's, NSAID's, modification of activity with decreases in all repetitive overhead activity.
- Inferior glides (like the sulcus sign) to decompress the GH joint.

Treatment

- Focus on strengthening of Teres Minor and Infraspinatus (external rotation) to increase inferior positioning of the humeral head, thus minimizing impingement.

Rotator Cuff Tears



Chronic Cuff Tears

- Result from degeneration within the cuff tendons.
- A fall impacting the humeral head on the acromion may cause a full thickness tear.

Signs and Symptoms

- Gradual loss of strength in abduction and external rotation with increasing persistent pain in this region.
- Night pain is common and difficult to locate being described as deep inside the shoulder.

Treatment

- If the tear is small, a rest of approx. 4-9 months may result in healing.
- Range of motion exercises are indicated unless they cause discomfort. If cuff exercises cause pain they should be discontinued for a number of weeks.

Treatment

- If the condition does not improve then surgery may be indicated.
- Rehabilitation following a repair takes from 6 months to a year.

Treatment

- Exercises are graded from isometric strengthening initially and progress to shoulder shrugs and pendular activities.

Treatment

- At 4 weeks, progressive abduction and external rotation in supine on a plinth can begin.
- At 6 weeks gentle anti-gravity strengthening can begin, progressing to full range of movement and full range with the hand weighted.

Bursa

- Sandwiched between the rotator cuff muscle layer and the outer layer of large bulky muscles is a structure known as a [bursa](#).
- A bursa is simply a closed space between two moving surfaces that has a small amount of lubricating fluid inside.



Bursitis of the Shoulder

- Caused by inflammation of the subacromial bursa and is usually secondary to impingement injuries.
- Rotator cuff stretching may reduce symptoms by allowing greater room under the acromial arch therefore reducing impingement and irritation.

Shoulder Dislocation and Instability



DEGREE of INSTABILITY

- Subluxation
- Dislocation, self reduction
- Dislocation
- Separation*



DEGREES OF INSTABILITY

- ❑ **SUBLUXATION-**
Symptomatic translation
- ❑ **DISLOCATION-**
complete separation of joint surfaces
- ❑ **APPREHENSION**
Fear of Dislocation



Shoulder Subluxation

- ❑ The ligaments that reinforce the joint capsule have a considerable amount of slack so that the shoulder is relatively unrestricted as it moves through its range of motion.
- ❑ Sometimes the humerus slips partially out of the glenoid and then returns to its normal position. This is called subluxation.



Shoulder Instability

- ❑ Instability: the shoulder is too loose and has a potential to sublux or dislocate.
- ❑ The initial injury is usually fairly significant and the shoulder must be reduced prior to rehabilitation commencing.



Shoulder Instability

- ❑ After that first violent injury that causes the shoulder to dislocate, the joint may remain unstable.
- ❑ The damaged ligaments may remain stretched and *too loose* to keep the humeral head in the glenoid, especially in certain shoulder positions.



Dislocation of the GH Joint



DIRECTION

- ❑ Anterior
- ❑ Posterior
- ❑ Multidirectional



Dislocations

- (a) **Anterior dislocations** - occur when an external rotation/abduction force on the humerus or a direct posterior or posterolateral blow occurs.
- The anterior capsule is stretched or torn within its substance or from its attachment. Two pathological lesions are typical with anterior dislocation:

Shoulder Dislocation

- Separation of the articular surfaces of the glenohumeral joint.
- 97 out of 100 dislocations are anterior.
- 3 out of 100 dislocate posteriorly.
- Repeated dislocations can cause further injury to the shoulder and can lead to arthritis of the shoulder if not treated.



Anterior Dislocations

- (i) **Bankart Lesion** - anterior capsule injury associated with a tear of the glenoid labrum.
- (ii) **Hills-Sachs Lesion** - where there is an indentation or compression fracture of the articular surface of the humeral head by the glenoid labrum.

Anterior Dislocations

- With anterior dislocation there is a risk of injury to the axillary nerve due to the weight of the upper limb hanging free by the side.

Gleno-Humeral Dislocation



Posterior Dislocations

- the posterior capsule is stretched and torn.
- A posterior Hills-Sachs lesion is created on the articular surface.
- There may be injury to subscapularis or its insertion.

Posterior Dislocations

- The primary sign is a prominence of the humeral head posteriorly to the shoulder, the shoulder is held in internal rotation and cannot be externally rotated.



Fig. 26 Patient able to posteriorly sublux his shoulder.

Gleno-Humeral Dislocation

- Initially, exquisite pain until joint is reduced
- Paresthesias or numbness in hand and arm
- Sense of instability or apprehension
- Weakness if rotator cuff is torn or stretched

MECHANISM

- Traumatic
- Atraumatic
- Voluntary
- Involuntary



INSTABILITY ALLOWS
HUMERAL MIGRATION...

IMPINGEMENT

IMPINGEMENT IS THE
SECONDARY DIAGNOSIS

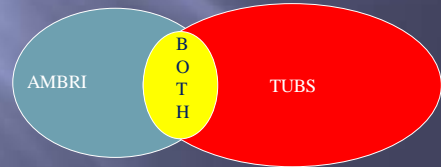


CLASSIFICATION

AMBRI -VS- TUBS

Atraumatic	Tramatic
Multidirectional	Unidirectional
Bilateral	Bankhart
Rehab, usually effective	Surgery
Inferior capsule shift key	

Traumatic and Atraumatic: Not Mutually Exclusive

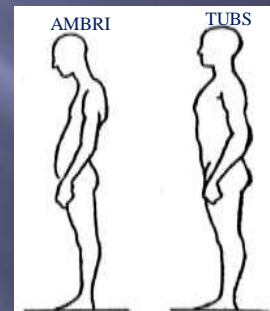


AMBRI INSTABILITY

- ▣ Atraumatic
- ▣ Multidirectional
- ▣ Bilateral
- ▣ Rehabilitation effective
- ▣ Inferior capsule shift

A.M.B.R.I.

- ▣ Voluntary or involuntary
- ▣ General laxity
- ▣ Rehabilitation Candidate
- ▣ Posture Related
- ▣ Gender Bias



ATRAUMATIC Signs/Symptoms

- ▣ General hypermobility
- ▣ Mild to Moderate inflammation
- ▣ General Weakness
- ▣ Poor Posture
- ▣ Anxious



AMBRI

- ▣ 80% satisfactory with rehab (Rockwood)
- ▣ Avg. 75% satisfactory with Rehab



ATRAUMATIC Treatment

- ❑ Heat or Ice, Meds
- ❑ Exercise
- ❑ Posture/Positioning
- ❑ Counseling
- ❑ Duration 2-4 weeks



MICROTRAUMA Signs/Symptoms

- ❑ Overhead athlete
- ❑ 15-35 years old
- ❑ Associated pathology
- ❑ Overuse Syndrome
- ❑ Muscle imbalance
- ❑ Faulty Biomechanics
- ❑ Impatient

MICROTRAUMA Treatment

- ❑ Ice, electrical Stimulation, Rest, NSAID
- ❑ Scapular & Rotator Cuff Strength and endurance, Flexibility
- ❑ Biomechanical adjustments
- ❑ Functional progression
- ❑ Duration 4 to 8 weeks

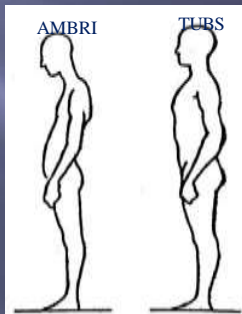
TRAUMATIC

Single episode (rehab effective)
VS.

Recurrent (rehab questionable)

TUBS INSTABILITY

- ❑ Traumatic
- ❑ Unidirectional
- ❑ Bankhart lesion
- ❑ Surgery frequent



T.U.B.S.

- ❑ Traumatic
- ❑ Usually anterior direction
- ❑ Surgery (Bankart Lesion)



TUBS

- ❑ 99% recurrence if <20yo at initial trauma (AusSm)
- ❑ >20yo 17% recurrence (Yoneda)
- ❑ >20yo 25% recurrence (Aronen)
- ❑ D/L x2..poor non-surgery results

Traumatic D/L

- ❑ 20% posterior
- ❑ 80% anterior
- ❑ ? MDI



TRAUMATIC

- ❑ Immobilization 3 to 4 weeks
- ❑ Rehab-Similar to Post-Op
- ❑ Duration 10-12 weeks



Glenoid Labrum



Labral Tear

- ❑ The labrum deepens the concavity of the glenoid fossa to allow for more potential contact between the humeral head and the glenoid.
- ❑ The labrum is a fibrocartilaginous rim that can be damaged or torn through compression or through distraction vis the pull of the biceps brachii.



Labral Tear

- ❑ A tear of labrum can be very difficult to diagnose
- ❑ Presents with pain and a *catching* sensation with movement of the shoulder.



Labral Tear

- ❑ The labrum can move in and out of the joint, potentially getting caught between the humeral head and glenoid, and cause pain and catching.
- ❑ The labrum is also an area for attachment of several of the tendons and ligaments of the shoulder.
- ❑ The ligaments that attach to the labrum help with maintaining the stability of the shoulder.



Labral Tear

- ❑ Many labral tears are the result of an injury to the shoulder, such as falling on an outstretched hand.
- ❑ There is reason to believe that the excess motion of the humerus moving around on the glenoid may cause damage to the labrum over time.
- ❑ An unstable shoulder may therefore cause injury to the labrum, if it repeatedly dislocates out of the glenoid.



SLAP Lesions

- ❑ Superior Labrum Anterior-Posterior injury – describes the way the labrum tears
- ❑ The superior aspect of the labrum anchors the long head of the biceps
- ❑ One theory is that if the shoulder subluxes the biceps contracts to stop the movement and the labrum tears

SLAP Lesions

- ❑ Second theory is that repetitive stress is responsible
- ❑ Diagnosed by MRI but PT's use Obrien's test, Crank test and anterior drawer test to elicit instability

Types of SLAP Lesions

- ❑ Type I – biceps tendon still securely attached to the labrum
- ❑ The labrum will be worn and/or frayed
- ❑ Most common type of injury – approx 75% of all tears
- ❑ Often associated with RC tears
- ❑ Usually treated by surgical debridement

Type of SLAP Lesions

- ❑ Type II – both the biceps tendon and the labrum are involved and may have just started to become detached from the supra-glenoid tubercle
- ❑ Typically the middle and superior glenohumeral ligaments are unstable too
- ❑ Surgical repair occurs by tacking the labrum and tendon back to their anchor sites

Types of SLAP Lesions

- ❑ Type III – similar to a “bucket handle tear” in the meniscus of the knee
- ❑ Biceps tendon is stable on the glenoid tubercle but a flap of labral tissue hangs down into the joint
- ❑ Surgical repair may occur or excision of the flap may be required.

Types of SLAP Lesion

- ❑ Type IV – labrum presents with a bucket handle tear that extends into the body of the biceps tendon.
- ❑ Complex may still be relatively stable on the glenoid
- ❑ Surgeon may remove the torn labrum piece and repair the tendon
- ❑ If the complex is unstable then the surgeon will tack the complex back to the glenoid

Symptoms of SLAP Lesions

- ❑ May mimic impingement syndromes
- ❑ Pain with overhead activities
- ❑ Pain with resisted biceps contraction
- ❑ The resisted Supination External Rotation Test – Myers et al 2005

Rehabilitation Following SLAP Lesion

- ❑ Depends on the type of the SLAP lesion and the nature of the injury received
- ❑ If surgical repair then need to follow surgeon’s instructions
- ❑ Main focus will be pain relief while shoulder movement is restricted
- ❑ Increase range of motion once labrum/tendon has healed

Adhesive Capsulitis (Frozen Shoulder)

- ❑ Clinical entity that begins with any form of inflammatory process about the shoulder.
- ❑ The inflammation leads to a progressive limitation in the range of motion of the shoulder joint, primarily caused by thickening and contraction of the joint capsule.

AAOS – Frozen Shoulder

- ❑ Affects 2% of the population, more common in women aged 40 – 70 years.
- ❑ Occurs more commonly in patients with diabetes (10-20% affected)
- ❑ Other risk factors include hypothyroidism, hyperthyroidism, Parkinson’s disease and cardiac disease or surgery.

Symptoms of Frozen Shoulder

- ❑ Pain – usually a dull ache which becomes sharp with movement.
- ❑ Decreased range of motion and stiffness.
- ❑ Three stages described:

Stage One: Freezing

- ❑ May last from 6 weeks to 9 months
- ❑ Patient develops a slow onset of pain
- ❑ As pain increases, motion decreases

Stage Two: Frozen

- ❑ Marked by a slow improvement in pain
- ❑ Stiffness remains
- ❑ Generally lasts between 4-9 months

Stage Three: Thawing

- ❑ Shoulder motion gradually begins to improve
- ❑ Generally last 5-26 months

Treatment Options

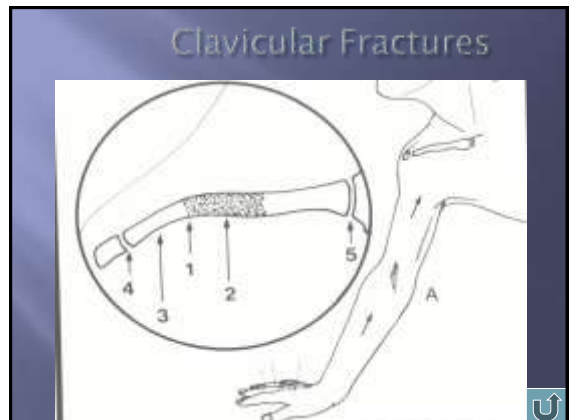
- ❑ Leave it alone and wait
- ❑ Pain control
- ❑ Restoration of motion
- ❑ Best results occur if rigorous treatment is given early on and loss of range is denied
- ❑ Surgical – in rare occasions
- ❑ Manipulation under anaesthetic

FRACTURES OF THE SHOULDER GIRDLE



Clavicular Injuries

- ▣ Usually caused by a fall on the outstretched arm with force transmitted up through the clavicle.
- ▣ Clavicle may also be injured through a fall on the point of the shoulder or direct violence.
- ▣ # is most common at the junction of the middle and outer thirds, as well as middle third fractures alone.



Fracture Types

- ▣ Typically greenstick in children. Healing is usually rapid and reduction not required.
- ▣ In adults undisplaced fractures are common with late slippage rare and early healing prominent.
- ▣ With greater violence there may be displacement of the ends with the shoulder losing the prop effect of the clavicle.
- ▣ Increased displacement leads to shortening.

Treatment

- ▣ Some form of support is needed - usually a broad-arm sling or collar and cuff sling.
- ▣ No other treatment is needed if undisplaced.
- ▣ When displaced, reduction is used to correct the anterior drift of the scapula around the chest wall.
- ▣ Figure of eight bandage or quoit is used to brace both shoulders posteriorly applying pressure anteriorly.

Support for the Clavicle



Fractures of the Humerus

- Fractures to the humerus may involve:
 - the anatomical neck (rare)
 - the surgical neck (more common)
 - the shaft
 - the epicondyles (medial or lateral)

Neer's Classification of Humerus

- **Group 1** - all fractures of the proximal humerus irrespective of comminution, where there is minimal displacement or angulation (< 1cm or < 45°).



- **Group 2** - fractures of the anatomical neck which are displaced by more than 1cm. These may be complicated by avascular necrosis.
- **Group 3** - all appreciably displaced or severely angled fractures of the surgical neck. These may be impacted, displaced or comminuted.

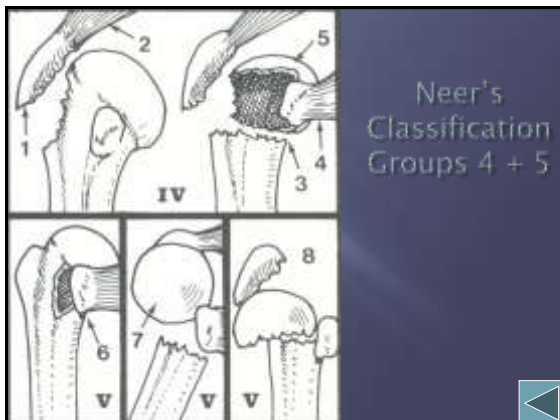
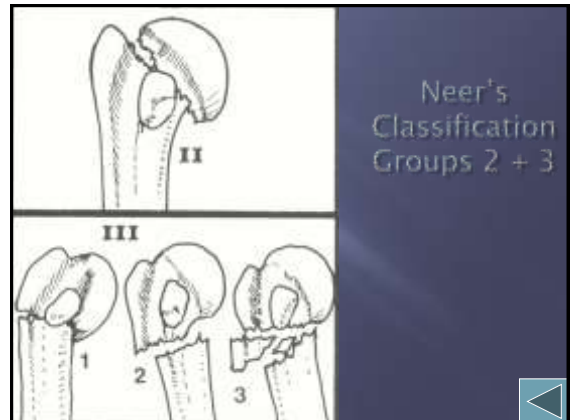
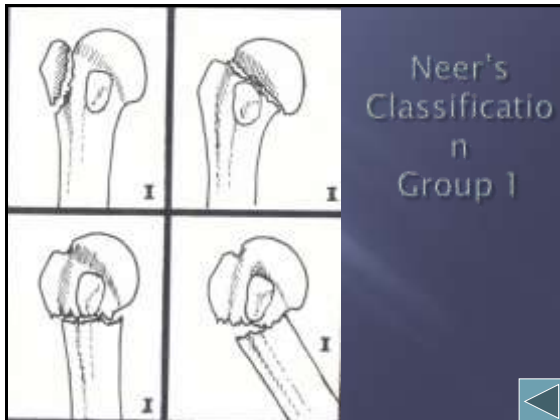


- **Group 4** - all fractures of the greater tuberosity, which may be displaced by the pull of the supraspinatus tendon.
- **Group 5** - these involve the lesser tuberosity and include 3 part or 4 part injuries which may cause rotation of the humeral head depending on which muscle attachments remain intact.



- **Group 6** - comprises the fracture-dislocations. Dislocation of the shoulder with a # greater tuberosity is common although # surgical neck and dislocation is more serious.





Fractures of the Shaft of Humerus

- ▣ Result from direct violence (fall or blow) or indirect violence (fall on the outstretched hand).
- ▣ In upper third #'s the prox. fragment will be pulled into add. by pec. major.
- ▣ Middle third #'s will be pulled into abduction by deltoid.
- ▣ Radial nerve involvement is common.



Treatment

- ❑ Usually involves immobilisation in POP or a light weight cast with support in a sling for 2-3 weeks.
- ❑ The immobilisation is usually removed around 6-9 weeks.
- ❑ Gentle exercise is begun to stretch and strengthen associated muscles.
- ❑ Care taken not to promote myositis ossificans.

Supra-condylar Fractures

- ❑ These occur in the distal third of the humerus, and usually in children.
- ❑ Potentially dangerous due to proximity of the brachial artery, ulnar, radial and median nerves.
- ❑ Surgical repair may be required with the fracture site usually wired together alternatively small screws may be used.

Treatment of Supra-condylar #'s

- ❑ Ensure blood supply is not compromised - may lead to Volkmann's ischaemia.
- ❑ Active wrist and finger exercises are encouraged to maintain ROM of the hand.
- ❑ Active exercises are begun once sufficient healing has occurred.
- ❑ Care not to promote myositis ossificans.