

TOPIC OUTLINE 7- THE SHOULDER COMPLEX.

Introduction.

The shoulder complex is composed of three joints and one “articulation”.

1. The sternoclavicular joint
2. The acromioclavicular joint
3. The glenohumeral joint (the shoulder joint)
4. The scapulothoracic articulation.

All four work together in a synchronous rhythm to allow the shoulder complex universal motion.

Unlike the hip, which is a stable joint having a deep acetabular socket for support, the shoulder is a mobile joint with a shallow glenoid fossa. The humerus is suspended from the scapula by soft tissue, muscles, ligaments, and a joint capsule with only minimal osseous support.

As the shoulder complex has compromised stability for mobility it is a common area of dysfunction. Conditions affecting the shoulder range from pathological processes/ degenerative conditions to musculo-skeletal injuries.

The shoulder complex is a difficult area to assess accurately. The practitioner has to assess four “joints” effectively as well as consider pain referral from the cervical/thoracic spine, the elbow/wrist, thoracic viscera, abdominal viscera and a variety of pathologies.

Along with a competent clinical examination, a working knowledge of anatomy, orthopaedic/pathological conditions as well as an accurate case history will allow for an effective diagnosis and management plan.

Initial Regional Inspection

Factors to consider in the regional inspection include:

- Atrophy or fasciculations
- Deformities, oedema, discolouration, laceration
- Symmetry and arm dominance effect on posture
- Postural abnormalities, head posture, shoulder posture, thoracic kyphosis
- Scapular winging
- Step – off deformity (acromion-clavicular joint)
- Rupture of long head of the biceps tendon
- Contours of the pectoralis major muscle

Ref. (Passor – Musculoskeletal Physical Examination Competencies List 2000 – 2001)

Once the initial regional inspection of the shoulder and other significant areas has been conducted the palpation of both bony and soft tissue structures can be carried out.

Palpable Structures – Bony Structures

The list of the bony structures that are palpated in this region include:

- Suprasternal notch
- Sternoclavicular joint
- Clavicle
- Coracoid process
- Acromioclavicular joint
- Acromion
- Greater tuberosity of the humerus
- Bicipital groove
- Spine of the scapula
- Medial border of the scapula
- Superior angle of the scapula
- Inferior angle of scapula
- Lateral border of the scapula

Palpation of Landmarks

The palpation begins with the patient seated and the practitioner positioned behind the patient.

Suprasternal Notch

The superior margin of the manubrium is contacted, the sternum is assessed for respiration, as well as tenderness or dysfunction.

Sternoclavicular Joints

From the contact on the suprasternal notch, palpate laterally to assess the medial aspect of the clavicles – the sternoclavicular joints. The joints are assessed quality and range of motion by asking your patient to elevate and depress their shoulders. Should a subluxation or dislocation is to occur at this joint, the medial aspects of the clavicles displaces superomedially.

Clavicle

The palpation is continued laterally from the sternoclavicular to assess the clavicles. Palpating the clavicles assess for any callus formation from previous fractures.

Coracoid process

At the mid point of the concavity of the clavicle. Palpate inferiorly until a bony landmark is identified, this being the coracoid process. The coracoid process is the insertion point of 3 main muscles, short head of the biceps, coracobrachialis and pectoralis minor.

Acromioclavicular joint

Palpate back along the clavicle laterally. A marked ridge is palpated where the lateral edge of the clavicle meets the acromion forming the anteromedial orientated acromioclavicular joint. The joint is palpated during flexion and extension, assessing for quality and ease of movement as the acromioclavicular joint is often involved in secondary osteoarthritis.

Acromion

Lateral to the acromioclavicular joint the acromion of the scapula is palpated. It is an important bony landmark due to its muscular attachments and relationship with the shoulder bursae.

Greater Tuberosity of the Humerus

The greater tuberosity of the humerus is a large distinct landmark palpated by dropping laterally into the soft tissue of the deltoid muscle about 4cm below the acromion.

Bicipital groove

Between the greater and lesser tuberosities is the intertubercular groove or the bicipital groove as it is more commonly known as. The greater tuberosity forms the lateral lip and the lesser tuberosity the medial lip. With the patients arm in neutral, it is located in the anterolateral aspect of the shoulder, level with rib 2.

The greater tuberosity is located and the patient is asked to continually and slowly externally and internally rotate their shoulders. This movement allows the greater tuberosity to move laterally, therefore allowing the practitioner to palpate the bicipital groove.

The bicipital groove is a common site of discomfort in the shoulder due to its muscular relations. The long head of biceps runs in the groove, pectoralis major attaches to the lateral lip, teres major to the medial lip and Latissimus dorsi to the floor. The tendon of biceps is also overlaid by the transverse humeral ligament which constitutes part of the anterior capsule of the glenohumeral joint.

Posterior palpation

Spine of the Scapula

The spine of the scapula is approximately level with the spinous process of T3. palpate along the spine of the scapula assessing for tenderness arising from the muscular insertions.

Medial border

The medial end of the spine of the scapulae terminates at the medial border, approximate to the insertion of the rhomboids minor muscle.

Superior Angle

This area is difficult to palpate as the trapezius muscle over lies the superior angle. Tenderness may indicate dysfunction of the levator scapulae muscle.

Inferior Angle

The medial border is palpated inferiorly to approximately the spinous process of T7- the inferior angle. The inferior angle is also one of the attachment point of the Latissimus dorsi.

Lateral Border

From the inferior angle palpate superiorly along the lateral margin of the scapulae. The Latissimus dorsi and teres minor limit palpation.

Palpable Structures – Soft Tissue Structures

The soft tissue palpation of the shoulder is divided into four zones.

- Rotator Cuff Muscles

- Supraspinatus
- Infraspinatus
- Teres Minor
- Subscapularis

- Palpable Bursae

- Subacromial and Subdeltoid Bursae

-Axilla

- Lateral wall
- Medial wall
- Anterior wall
- Posterior wall
- Apex
- Floor

- Prominent Muscles

- Sternocleidomastoid
- Pectoralis Major
- Biceps
- Deltoid
- Trapezius
- Rhomboids
- Latissimus Dorsi
- Serratus Anterior

Rotator Cuff Muscles.

The patient is seated with their shoulders passively extended by 15°, allowing exposure of the muscles from the coracoacromial arch.

3 of the rotator cuff muscles are readily palpable and are assessed from origin to insertion.

Palpation commences with the Supraspinatus muscle. Supraspinatus originates from the supraspinous fossa of the scapula and inserts to the superior facet on the head of the humerus.

Next, the Infraspinatus, which originates from the infraspinous fossa to the middle facet on the head of the humerus. Lastly, the Teres minor muscle. This muscle originates on the lateral border of the scapulae to the inferior facet on the head of the humerus.

The Subscapularis muscle is difficult to palpate. The muscle can be assessed by applying a superior palpation into the posterior aspect of the axilla between the scapula and the rib cage. This palpation can be uncomfortable.

Palpable Bursae

The acromion is located. Palpate laterally to “drop off” the acromion on to the head of the humerus, as you “drop off” a distinct ridge between the two structures marking the joint line is palpated.

If the subacromial or sub deltoid bursae are inflamed, then the palpable ridge is obliterated.

Axilla

The axilla is a quadrilateral pyramid with the apex being comprised of the glenohumeral joint and the brachial plexus, and the floor being the skin and hair of the axilla itself.

Lateral wall

The patients arm is abducted and the practitioner places their hand in the axilla facing laterally. The tendon of coracobrachialis and the triceps muscle should be palpated.

Between these two structures the humerus is palpated as well as the pulse of the brachial artery. The pulse is assessed for rate, rhythm and amplitude.

Medial wall

The practitioner palpates along the medial aspect of the axilla assessing for ribs. The highest rib palpable is rib 2. The lateral aspect of the ribs are palpated to assess for the serratus anterior muscle.

Anterior Wall

This is comprised of the pectoralis major muscle and is assessed between the thumb and index finger of the practitioner.

Posterior Wall

This is comprised of the Latissimus dorsi and Teres major muscle. The posterior wall is assessed as described for the anterior wall.

Prominent Muscles

Sternocleidomastoid muscle

Palpate this muscle superficially and bilaterally from origin to insertions, avoiding the carotid areas. Assess for haematomas, torticollis and lymph nodes along the anterior and posterior borders. This muscle is commonly injured in whiplash injuries.

Pectoralis Major

Palpate this muscle from origin to insertion, assessing for tenderness and fibrosity. Ensure you assess the tendon as well as the belly.

Biceps

Palpate from origin to insertion assessing for tenderness and fibrosity. Assess both tendons as they are commonly injured.

Deltoid

Assess as described above, ensuring the three bellies of deltoid are assessed.

Trapezius

Palpate this muscle from origin to insertion assessing for tenderness and fibrosity. The entire muscle is assessed, from the occiput to the thoracolumbar junction.

Rhomboids

Palpate the medial borders of the scapulae to the thoracic spine to assess these muscles. They are a common site of mid thoracic discomfort and anteriorized shoulders can be indicative of rhomboid weakness.

Latissimus dorsi

Palpate this muscle from origin to insertion assessing for tenderness and fibrosity.

Serratus Anterior

This muscle is assessed as described earlier, but its scapular insertion can be assessed by palpating the anterior aspect of the medial border of the scapula. Winging of the scapula is indicative of serratus anterior dysfunction.

Orthopaedic Examination.

As the orthopaedic examination is assessing four “joints” it is important to note that during your active examination clear and concise instructions are given to your patient.

Begin your assessment on the asymptomatic side assessing for ease, quality and range of movement as well as a comparison for the symptomatic side.

***Normal Range of Movement.**

* normal suggest an average from a “healthy” control group.

- Flexion – up to 180°
- Extension – 45°- 50°
- Abduction – up to 180°
- Adduction – 30°
- Internal Rotation – 45°
- External Rotation – 30°

Ref – The physiology of the joints – Kapanndji Volume 1 – Upper Limb

Active Movements.

- Flexion
- Extension
- Abduction
- Adduction (with flexion)
- Adduction (with extension)
- Internal Rotation
- External Rotation
- Apley movement (extension, internal rotation and adduction)
- Reverse Apley (flexion, external rotation and adduction)
- Protraction
- Retraction
- Scapula Elevation
- Scapula Depression
- A/C Elevation and Depression
- S/C Elevation, Depression, Protraction, Retraction, Internal and External Rotation.

Passive Movements.

The aim of the passive examination is to assess pure range of movements of all four articulations. Initially the scapulae has to be secured to isolate the movements to the gleno-humeral joint. When the assessment of the glenohumeral joint is completed the scapulae can be released to assess the scapulo-thoracic component of that movement.

The scapulae can be secured in two ways:-

1. Take a 5 finger contact on the scapulae and palpate for scapulo-thoracic movement as you take the patient through each movement.
2. Apply an inferior pressure over the acromioclavicular area until you reach the end range of movement of the gleno-humeral joint. Release the pressure to assess the scapulo-thoracic movement.

Movements to examine:-

- Flexion
- Extension
- Abduction
- Adduction (with Flexion)
- Adduction (with Extension)
- Internal Rotation
- External Rotation
- Protraction
- Retraction
- Scapula Elevation
- Scapula Depression
- A/C Elevation, Depression, Protraction, Retraction
- S/C Elevation, Depression, Protraction, Retraction, Internal/External Rotation.

SPECIAL TESTS.

Shoulder injuries can range from bursitis, muscle injury, tendon injuries to dislocation and pathology.

The case history will enable the practitioner to differentiate between specific conditions.

ROTATOR CUFF SYNDROME

Rotator cuff syndrome refers to injury to the rotator cuff muscles. The supraspinatus muscle is the most common injured rotator cuff muscle due to its anatomical location. (closest of the SITS muscle to the subacromial arch).

Causes for rotator cuff syndrome range from :-

- inflammation of the SITS tendons
- muscle/tendon rupture or tear of the SITS muscles

- calcification of the SITS
- subacromial bursitis.

RESISTED MUSCLE TESTS.

- Supraspinatus
- Infraspinatus
- Teres Minor
- Subscapularis

Supraspinatus

The patient flexes their arm to 90° with their elbow extended and their thumbs directed inferiorly. The patient then attempts to elevate the arms against examiner resistance. Pain or instability is indicative of a supraspinatus injury. This test can be referred to as the “EMPTY CAN” test.

Infraspinatus and Teres minor

The patient is positioned with their arm in a neutral position with their elbow flexed to 90°. The practitioner provides resistance against external rotation.

Subscapularis

Subscapularis function is assessed with the “lift – off” test. The patient rests the dorsum of the hand on the back of the lumbar area. Inability to move the hand off the lumbar spine by further internal rotation of the arm suggests injury to the Subscapularis muscle.

PAINFUL ARC SYNDROME.

The supraspinatus tendon can also become inflamed as it passes through the narrow tunnel between the acromion and the head of the humerus. Usually the tendon becomes inflamed or degenerates (due to overuse) where it crosses the humeral head.

Patients report pain in a limited arc of shoulder abduction as this is when the supraspinatus tendon is irritated. The pain is usually present only on active movements as the muscle is active and therefore an inflamed tendon will be irritated. It has been suggested that the painful arc of abduction is between 30 – 120°. (The 1st 30° of shoulder abduction is controlled by deltoid, then the SITS muscles take over).

A diagnosis of “Painful arc syndrome” is made by comparison of active and passive movements (pain on active, no pain on passive) as well as specific resisted muscle tests where appropriate.

Neer’s sign.

This test is designed to assess for subacromial impingement.

The patient is seated with their elbow “locked/straightened”. The practitioner contacts the forearm of the patient (between the elbow and wrist). The practitioner’s other hand fixes the scapulae with their index finger over subacromial area. A medial rotation of the arm is introduced to compress the subacromial space. The patient’s arm is then flexed (with the elbow straight) until pain is reported, or a maximum of 180 degrees of flexion is achieved. The combination movement of flexion and medial rotation compresses the subacromial space therefore highlighting irritation of the SITS tendons.

Hawkin’s sign.

Hawkin’s sign assesses for subacromial bursitis. It is a modification of the Neer’s sign.

The patient is positioned as above but the arm is bent at the elbow (90 degrees). Again medial rotation and flexion (up to 160 degrees) is applied to the arm to compress the subacromial space exposing the bursa.

Subacromial bursitis test.

Ref. Soft tissue palpation the Shoulder complex.

Recurrent dislocation test.

The most common direction for the G/H joint to dislocate is anterior inferior. The patient is seated. The practitioner fixes the scapulae and applies pressure to the posterior aspect of the humeral head. The patient’s arm is then abducted (90 degrees) and externally rotated (90 degrees). To increase the stress on the joint slight extension is applied.

If the patient is suffering from recurrent shoulder dislocation, this manoeuvre will reproduce pain, with muscle guarding. Most importantly the patient will not allow their shoulder to be taken into abduction and external rotation as they will be extremely apprehensive of dislocation.

All special tests for the shoulder are recorded to degrees of motion and reproduction of symptoms reported by the patient.