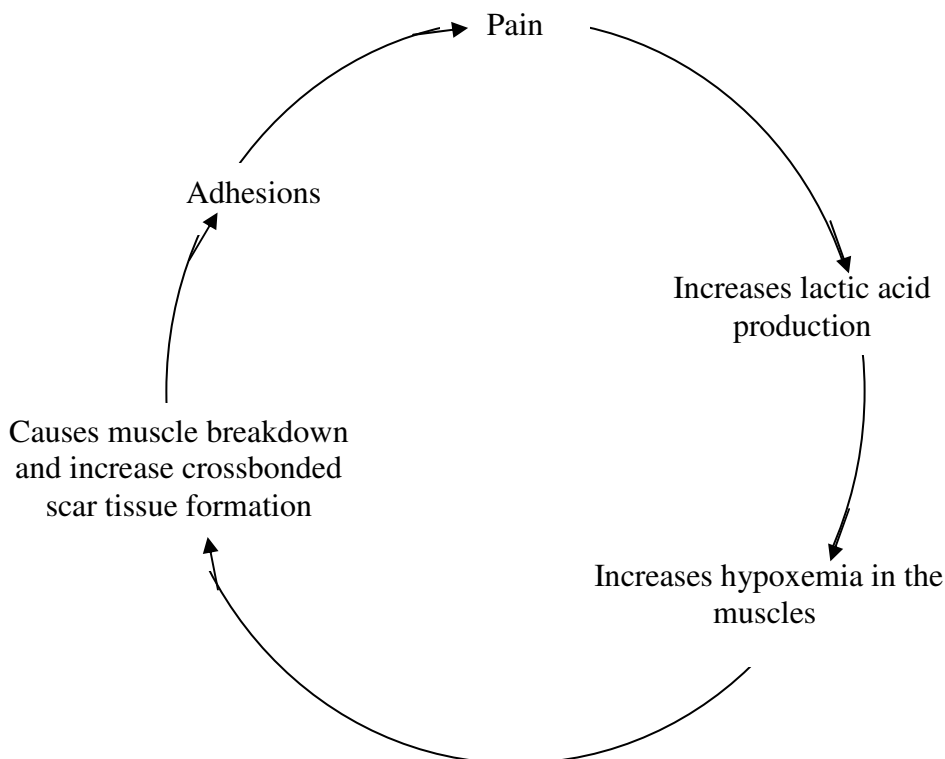


Practitioners treating a patient with hemiplegia may think in terms of treating a neurological diagnosis, but the larger understanding is that primary neurological impairments that do not receive effective treatment become orthopedic problems that can limit function.”

(Van Dyck, 2000, p. 1)

Orthopedic and neurological sequela of shoulder hemiplegia

Physiology of pain:



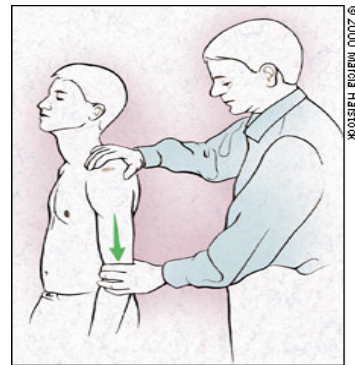
Shoulder pathology:

Instability → subluxation → impingement → rotator cuff tear

As motor control returns and spasticity increases, muscle imbalances emerge and the shoulder girdle malalignment increases.

Instability

- Sulcus test—pull arm down and if there is a subluxation then shoulder is unstable.



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Primary Impingement syndrome (as defined by Neer)

- The range of true glenohumeral abduction is approximately 120° because, during abduction of the arm, the greater tuberosity of the humerus must pass under the coracoacromial arch. This requires external rotation of the humerus and elevation of the acromion. External rotation is produced actively by contraction of the infraspinatus and teres minor. <http://www.aafp.org/afp/20000515/3079.html>
Elevation of the acromion of the scapula. (Burkhart, 2002, p. 22).
- Failure to externally rotate the arm during abduction will result in impingement of the structures within the suprahumeral space between the greater tuberosity and the corico-acromial arch. This occurs between 90 and 120° of abduction. Repeated impingement of the subacromial structures can result in inflammation and pain. Clinically, this is manifested as a “painful arc”, which is pain that

occurs with abduction of the arm between 90 to 130° of abduction (Burkhart, 2002, p. 22).

- ★ ○ Must have at least $\geq 45^\circ$ ER before elevating arm, i.e. scaption.
 - The most common position of contracture in the shoulder is GH internal rotation and adduction. Structurally, the relationship of the trunk and UE during functional movements can explain this. Spinal flexion (Whether initiated by a posterior pelvis weight shift or an anterior upper-body weight shift) produces scapular abduction and GH internal rotation. In addition, five internal rotators are evident. Including the powerful latissimus dorsi and pectoralis major, the subscapularis, teres major, and the anterior deltoid. Muscles that adduct the humerus include all of the internal rotators except the deltoid. Another prime mover of the humerus into adduction is the weight of the arm. The counterbalance for external rotation consists of smaller muscles including the infraspinatus, teres minor, and the posterior deltoid. (Van Dyck, 2000, p. 3).
- Pain is caused by impingement of the subacromial contents due to the loss of clearance between the coracoacromial arch and the humeral tuberosities. (Lewis, 2000, p. 6).

Subcoracoid impingement

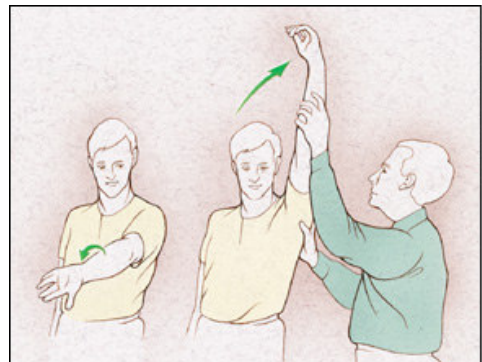
- Located in the subcoracoid, or coracohumeral interval, between the coracoid process and the lesser tuberosity of the humerus.
- The coracoid and the lesser tuberosity approximate during horizontal adduction causing impingement of the intervening structures—subscapularis bursa, subscapularis tendon, tendon of the short head of the biceps, and the anterior capsule of the glenohumeral joint.
- Especially in CVA patients.

- Functional task: washing opposite shoulder, swimming. Will have pain upon anterior and horizontal adduction.

Secondary impingement

Due to hypermobility or instability of the glenohumeral joint.

- Tests
 - Diagnostically non-specific. Could be the bursa, a tendon (rotator cuff and / or biceps), the inferior aspect of the acromion, the greater tuberosity or the superior aspect of the GH joint capsule.
 - Neer's: Position the patient sitting. Prevent scapular rotation with one hand. Internally rotate the arm with the thumb facing downward and forward flex the arm above 90°. If impingement is present, the patient will experience pain as the arm is abducted as the subacromial space is closed down.

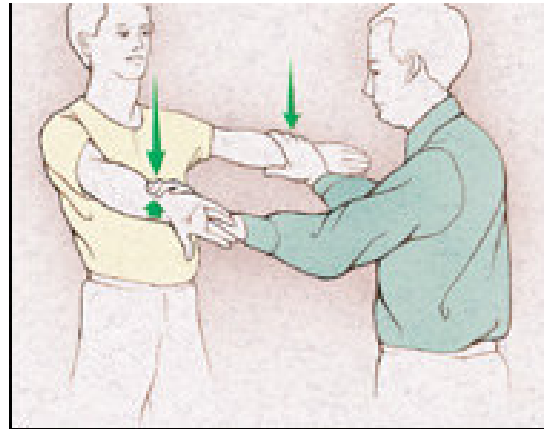


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- Supraspinatus test / Empty can test—In the plane of scaption, abduct the arm to 90° in the plane of the scapula with internal rotation (thumb down). Eccentric Supraspinatus test—used only if no other tests provoke symptoms—the patient is asked to resist downward pressure on the abducted arm. A test is positive if the patient is unable to hold the arm against resistance.

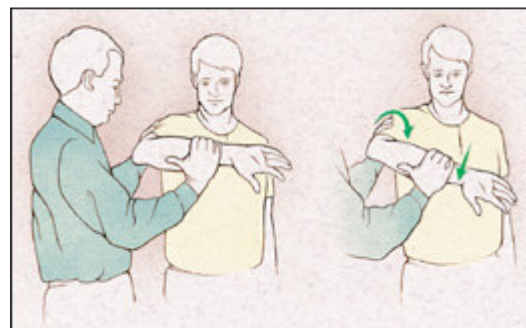
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- Hawkin's and Kennedy Impingement Test: Position the patient standing with the shoulder Adducted to 90° and then forcibly IR the shoulder. Slowly move the shoulder into horizontal adduction. The presence of anteromedial shoulder pain in horizontal adduction is indicative of possible pathology. There is usually no pain with abduction.

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- Subcoracoid impingement test: Horizontally adduct the arm fully across the body. Will see anteromedial shoulder pain. Abduction is usually asymptomatic.

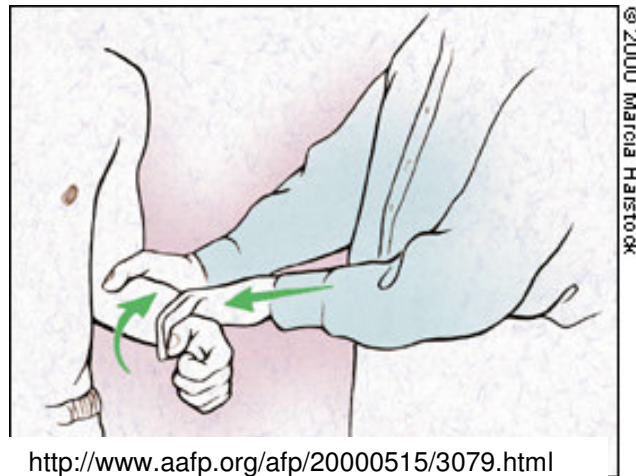
Bicipital tendonitis

- Failure of inferior rotator cuff can cause bicipital tendonitis.
- Inflammation of long head of biceps tendon usually occurs w/ rotator cuff inflammation
- Clinically, it may be difficult to differentiate the pain patterns of rotator cuff and biceps tendon inflammation
- Symptoms indicative of biceps inflammation include pain radiating to biceps, pain w/ internal rotation, & pain with elbow flexion.
- Biceps tendon dislocation is relatively rare and in the vast majority of cases, bicipital tendonitis may be attributed to impingement. A shallow intertubercular groove makes the tendon of the long head and its overlying ligament more susceptible to impingement.

○ Tests

- Pain over the bicipital groove is suggestive of biceps compromise

- Yergason test: biceps tendon stability; patient fully flexes elbow



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and supinates, therapist externally rotates and presses downward on flexed elbow; positive exam elicits pain

Other Miscellaneous

- Cervical screen—C-spine pathology always refers to the shoulder.

- Pain on medial border of scapula with palpation is rhomboids tightness—will need to stretch. This is indicative of pathology but not indicative of anything specific.
- Pain at the insertion of the deltoid may be a hematoma due to microtrauma or referral pain from the subacromial bursa. It is the most common referral site of rotator cuff pathology.

Treatment of the Hemiplegic Shoulder

Management of orthopedic issues

When a patient begins to develop shoulder pain the therapist must focus on the following:

- Identify the exacerbating factors and eliminate those as much as possible.
- Use modalities to eliminate pain
 - Iontophoresis with dexamethasone
 - US—continuous wave with concurrent stretch to gain length and ROM; do not use in conjunction with Iontophoresis
 - Moist Heat + LLPS—the minimum time to break crossbonds of scar tissue is 20 minutes to allow joint freedom.
- Gently grade I-II joint mobs
- Discuss with physician use of anti-inflammatories.
- Educate to cease “showing off” shoulder movement and to stop overhead activities.
- Facilitate active movement in the upper limb and trunk.
- Gentle stretch and myofascial release of trunk, scapula and pectoralis major especially. Break-up scapular adhesions before doing anything to see if this relieves the pain.

- Trunk:
 - Focus on stability, weight shifting, body awareness, trunk rotation and elongation.
 - Have patient turn toward affected side when reaching
 - Set-up room so that the patient must physically move to their affected side within the environment.
 - Most of the muscles that control UE stability and mobility arise from the trunk, i.e. the Serratus Anterior originates from the ribs and inserts onto the scapula. It “depends upon a stable thorax for efficient action; otherwise, it will elevate the ribs instead of the stabilizing and mobilizing the scapula” (Van Dyck, 2000, p. 3).

- Handling and positioning of the shoulder to reduce pain and improve function.
 - Must stop with pain upon shoulder movement. Reposition the arm and start again because *you* have not manually maintained the integrity of the shoulder joint and musculature.
 - Mobs don't necessarily increase ROM but does decrease pain and can decrease spasms.
 - Make sure the pelvis is stabilized before working on shoulder.
 - Lack of dissociation of humerus and scapula (lateral bulge) with elevation. Also noted with teres minor tightness.
 - Lift the hemiplegic arm by holding the humerus under the axilla and maintaining ER. This produces greater range of pain-free flexion at the hemiplegic shoulder than a “distal hold”. In a 2002 study by Tyson and Chissim, it was found that there was a 17.5-degree difference in ROM measurements with the different holds.
 - *Setting the shoulder*
 - “Unweight the arm to promote postural stability. The weight of the arm can pull the trunk out of alignment. Unweighting the arm will allow weak trunk muscles to be more active, which may lead to

increased scapular stability and functional use” (Van Dyck, 2000, p. 3).

- Shoulder subluxation and pain.

Diagnosed when there is a 1-finger breadth between the acromion and the head of the humerus by palpation.

- Use of slings
 - Don't unless there is a 2-finger subluxation or pain
 - Omotrain
 - Less restrictive, allowing for free use of hand and elbow while supporting shoulder
 - Decreases subluxation
 - Decreases pain
 - Easy to get on
 - Comfortable

Pain Prevention strategies

- PROM treatment with families at the Acute Care side—no PROM past 90 degrees.
- Support arm during transfers and mobility when in stage I and II.
- Shoulder should not be passively moved beyond 90° of flexion and abduction unless the scapula is upwardly rotated and the humerus is externally rotated.
- Don't use pulleys with unstable shoulders as this contributes to shoulder tissue injury.

Kumar et al analyzed the occurrence of pain in patients receiving three different rehabilitation exercise programs: range of motion by the therapist, use of a skateboard, and use of an overhead pulley. They found that patients who used the overhead pulley had the highest risk of developing shoulder pain and concluded that use of the pulley should be avoided during stroke rehabilitation (Walsh, 2001, p. 646).

- Need to decrease pain and re-establish non-painful ROM before continuing with neuromuscular re-education.
- Always externally rotate the shoulder before beginning shoulder movement to seat the joint properly
- Discuss the option of medications with the physicians if spasticity is significantly impedes skin integrity or is a functional problem.
- Use wheelchair support surface such as hemi-tray or arm trough (*--will keep arm in ER better, but is in the visual field less if neglect is present)
- “Awareness of potential injuries to the structures of the shoulder joint reduced the frequency of shoulder pain from 27% to 8%” (Walsh, 2001, p. 646).

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