

Shoulder complex



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Shoulder Complex

- Resting Position :55-70 degrees of Abduction and 30 degrees of H Add.



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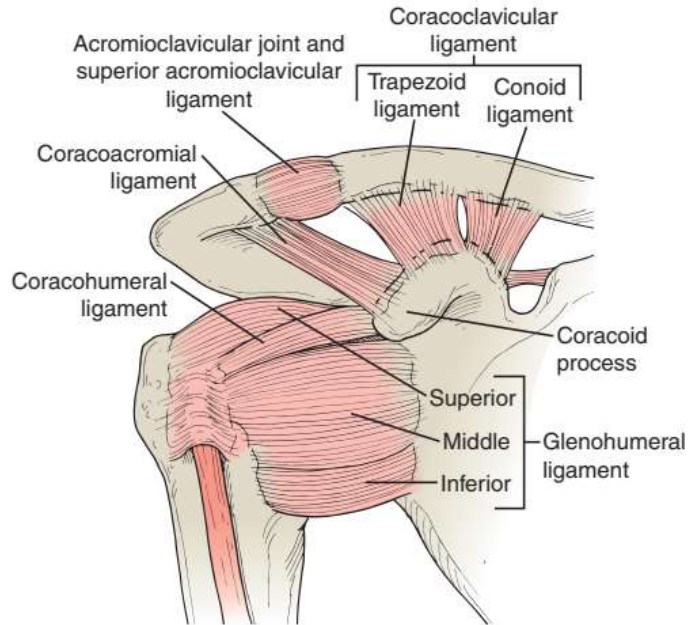


FIGURE 17.2 Ligaments of the glenohumeral (GH) and acromioclavicular (AC) joints.

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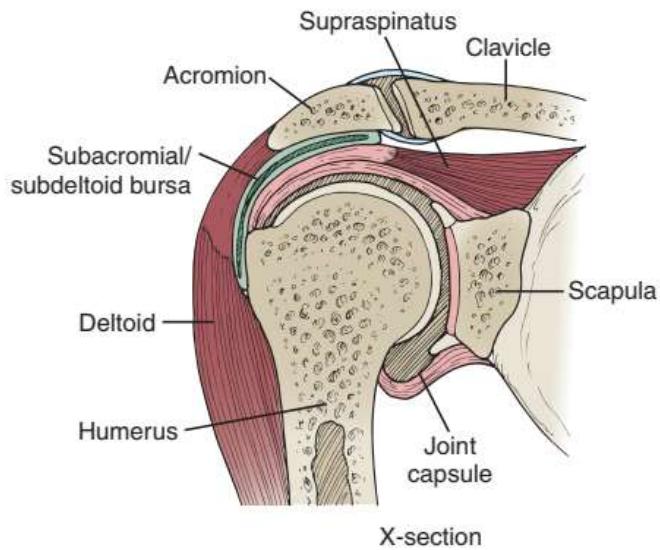


FIGURE 17.7 The supraspinatus and subacromial/subdeltoid bursa lie in the suprahumeral space.

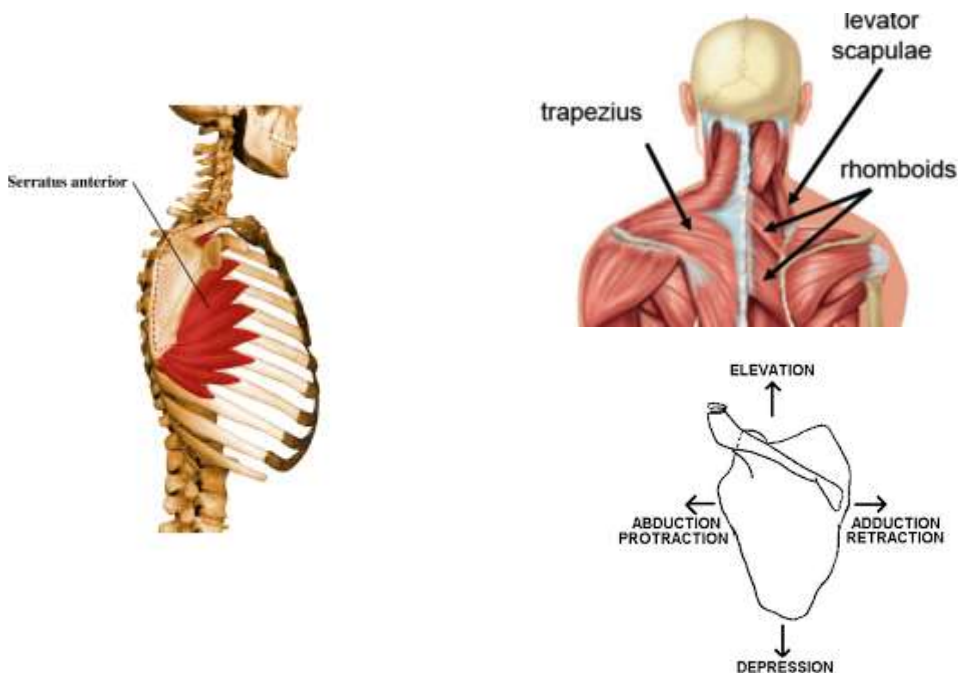
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Suprahumeral (Subacromial) Space

The coracoacromial arch, composed of the acromion and coracoacromial ligament, overlies the subacromial/subdeltoid bursa, the supraspinatus tendon, and a portion of the muscle

These structures allow for and participate in normal shoulder function. Compromise of this space from faulty muscle function, faulty postural relationships, faulty joint mechanics, injury to the soft tissue in this region, or structural anomalies of the acromion lead to impingement syndromes. **After a rotator cuff tear, the bursa may communicate with the GH joint cavity.**

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Scapulo-thoracic articulations

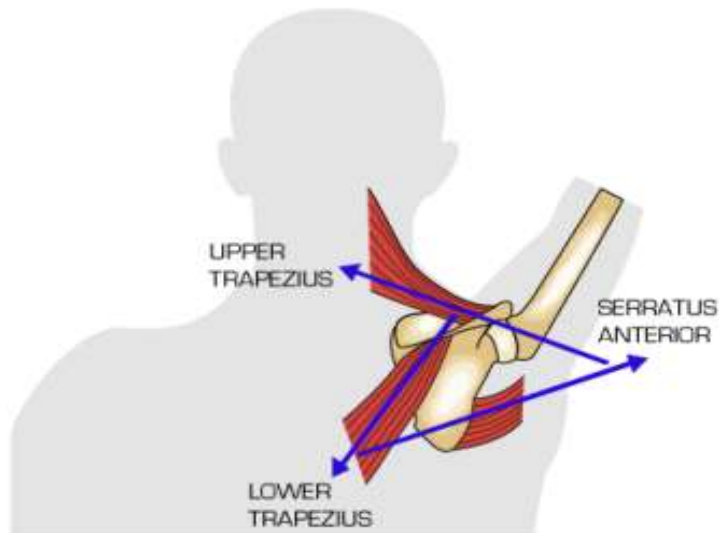
- Elevation, depression, protraction, and retraction
- **Elevation and depression in frontal plane**
- **Protraction and retraction in transverse plane**
- Component motions along with humerus

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Upward rotation e Arm Elevation



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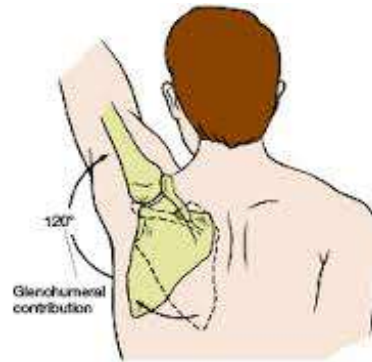
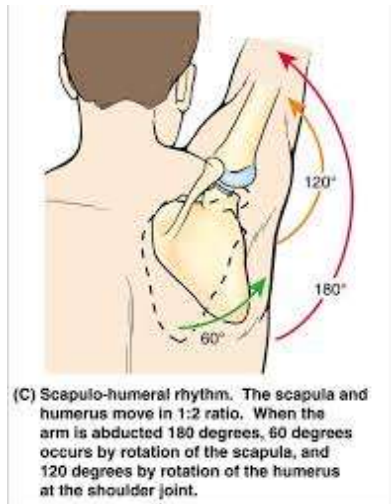
Upward rotation and post tilting

- Frontal plane Abd
- Flex
- Elevation in Scaption
- The upper and lower trapezius along with the serratus anterior rotate the scapula whenever the arm elevates



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Scapulo-humeral Rhythm



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- Faulty forward head, thoracic kyphosis, and shoulder girdle posture result in a forward tilt and **downward rotation** of the scapula with relative abduction and internal rotation of the humerus when the arm is in a dependent position.

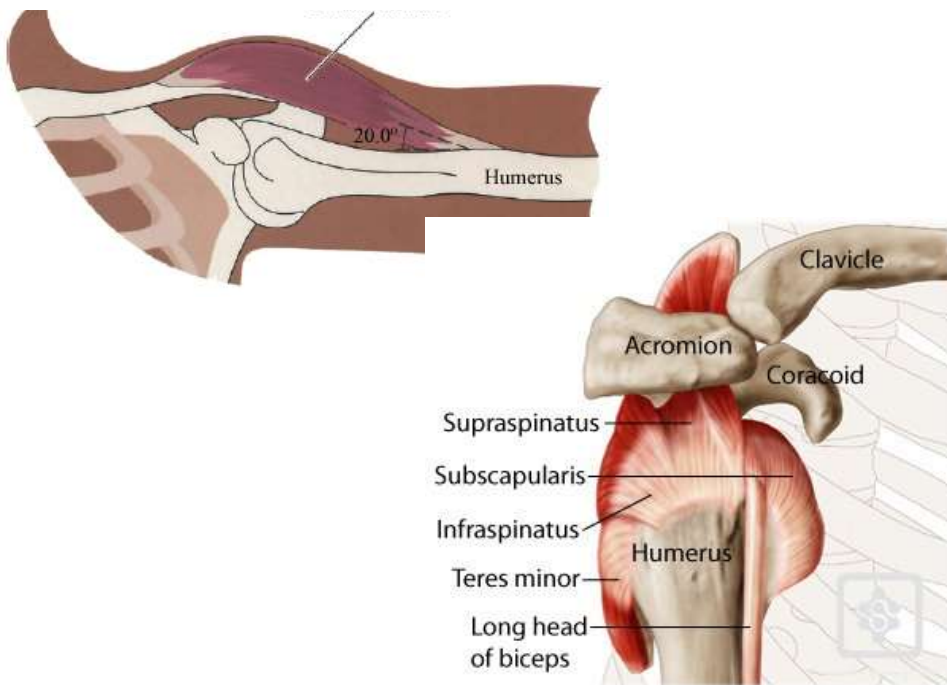


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External Rotation of the Humerus With Elevation

During elevation of the arm, the humerus externally rotates; this allows the greater tubercle of the humerus to clear the coracoacromial arch. **Weak infraspinatus and teres minor muscles or inadequate external rotation may result in impingement of the soft tissues in the suprahumeral space, causing pain, inflammation, and eventually loss of function.**

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Deltoid–Short Rotator Cuff and Supraspinatus Mechanisms

- Most of the force produced by the deltoid muscle causes upward translation of the humerus; if unopposed, it leads to impingement of the soft tissues in the suprahumeral space between the humeral head and the coracoacromial arch.
 - The combined effect of the short rotator muscles (infraspinatus, teres minor, and subscapularis) produces stabilizing compression and downward translation of the humerus in the glenoid.

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- The combined actions of the deltoid and short rotators result in a balance of forces that elevate the humerus and control the humeral head.
 - The supraspinatus muscle has a significant stabilizing, compressive, and slight upward translation effect on the humerus during arm elevation. It functions with the deltoid in humeral elevation

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Interruption of the coordinated function of these mechanisms may lead to tissue microtrauma and shoulder complex dysfunction.



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What is your observation?



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Common Sources of Referred Pain in the Shoulder Region

Cervical Spine

- Vertebral joints between C3 and C4 or between C4 and C5
- Nerve roots C4 or C5

Referred Pain From Related Tissues

- Dermatome C4 is over the trapezius to the tip of the shoulder.
- Dermatome C5 is over the deltoid region and lateral arm.
- Diaphragm: pain perceived in the upper trapezius region.
- Heart: pain perceived in the left axilla and pectoral region.
- Gallbladder: pain perceived at the tip of shoulder and scapular region (gallbladder stone Rt)

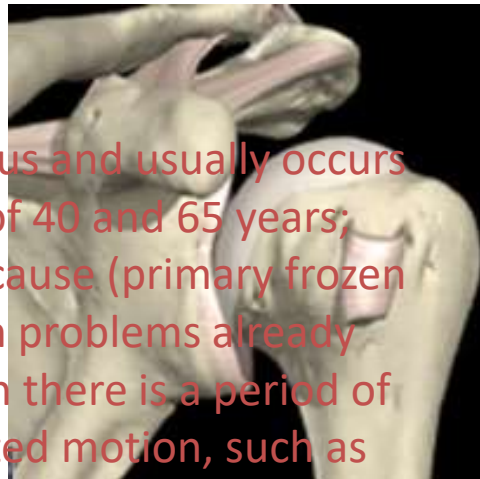
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Idiopathic frozen shoulder

- the development of dense adhesions, capsular thickening, and capsular restrictions, especially in the dependent folds of the capsule, rather than arthritic changes in the cartilage and bone, as seen with RA or OA



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- The onset is insidious and usually occurs between the ages of 40 and 65 years; there is no known cause (primary frozen shoulder), although problems already mentioned in which there is a period of pain and/or restricted motion, such as with RA, OA, trauma, or immobilization, may lead to a frozen shoulder (secondary frozen shoulder)

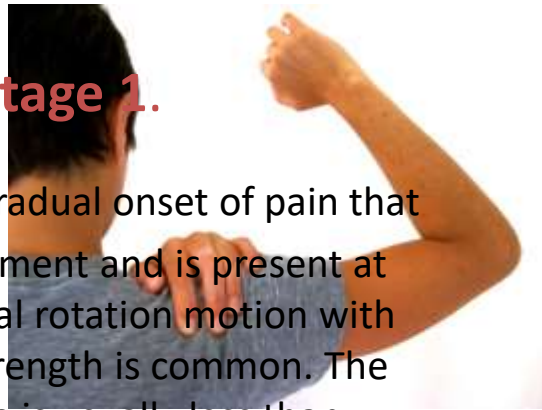
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- With primary frozen shoulder, the pathogenesis may be a provoking chronic inflammation in musculotendinous or synovial tissue, such as the rotator cuff, biceps tendon , or joint capsule. **Patients with diabetes mellitus and thyroid disease are at increased risk for developing the disorder.**

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Stage 1.

Characterized by a gradual onset of pain that increases with movement and is present at **night**. Loss of external rotation motion with intact rotator cuff strength is common. The duration of this stage is usually less than 3 months.



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Stage 2

Characterized by persistent and more intense pain **even at rest**.

Motion is limited in **all directions** and cannot be fully restored with an intra-articular injection. This stage is typically between 3 and 9 months.

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Stage 3

Characterized by pain **only with movement**, significant adhesions, and limited GH motions, with substitute motions in the scapula.

Atrophy of the deltoid, rotator cuff, biceps, and triceps brachii muscles may be noted. This stage is between 9 and 15 months

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Stage 4

Characterized by **minimal pain and no synovitis** but **significant capsular restrictions** from adhesions. Motion may gradually improve during this stage. This stage lasts from 15 to 24 months or longer. Some patients never regain normal ROM.

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- Some references indicate that spontaneous recovery occurs, on average, 2 years from onset, although others report longterm limitations without spontaneous recovery. Inappropriately aggressive therapy at the wrong time may prolong the symptoms.

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Common Impairments of Structure and Function

- Night pain and disturbed sleep during acute flares
- Pain on motion and often at rest during acute flares
- Mobility: decreased joint play and ROM, usually limiting external rotation and abduction with some limitation of internal rotation and flexion
- Posture: possible faulty postural compensations with protracted and anteriorly tilted scapula, rounded shoulders, or guarding the painful shoulder in a position of scapula elevation and arm adduction

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- Decreased arm swing during gait
 - Muscle performance: general muscle weakness and poor endurance in the GH muscles with overuse of the scapular muscles leading to pain in the trapezius, levator scapulae, and posterior cervical muscles
 - Increased scapulothoracic motion during arm movements to compensate for limited GH mobility

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Common Activity Limitations and Participation Restrictions

- Inability to reach overhead, behind head, out to the side, and behind back leading to difficulty dressing (putting on a jacket or coat , reaching hand into back pocket of pants (to retrieve wallet), reaching out a car window (to use an ATM machine), self-grooming (combing hair, brushing teeth, washing face), and bringing eating utensils to the mouth
 - Difficulty lifting heavy objects above shoulder level
 - Limited ability to sustain repetitive activities

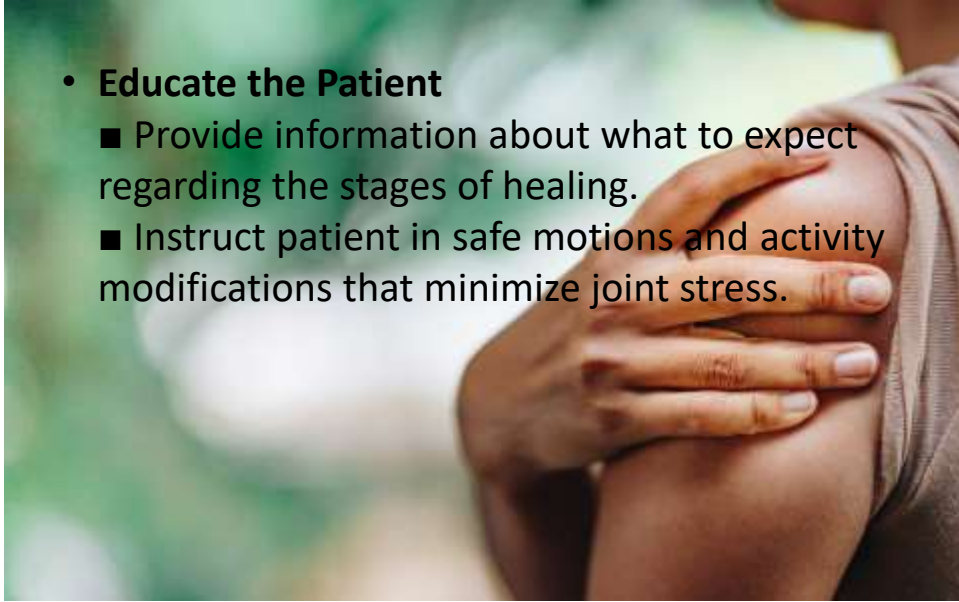
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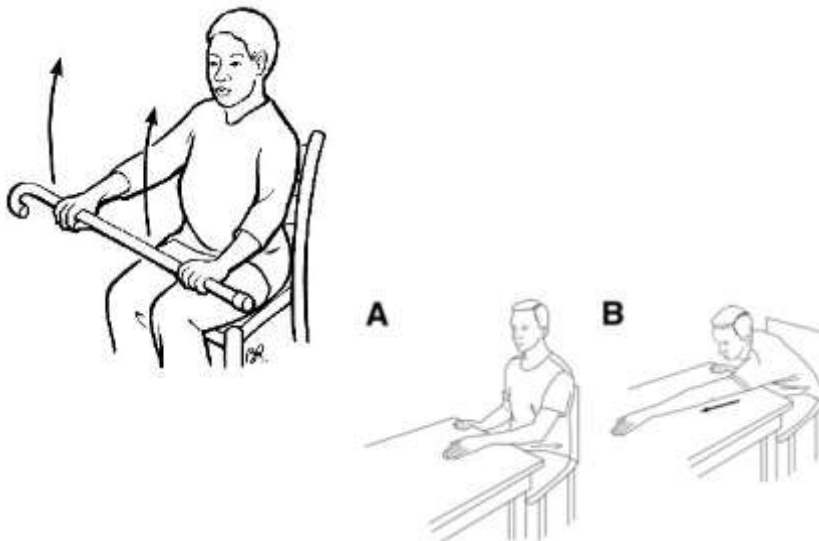
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GH Joint Hypomobility: Management— Protection Phase

- **Educate the Patient**
 - Provide information about what to expect regarding the stages of healing.
 - Instruct patient in safe motions and activity modifications that minimize joint stress.



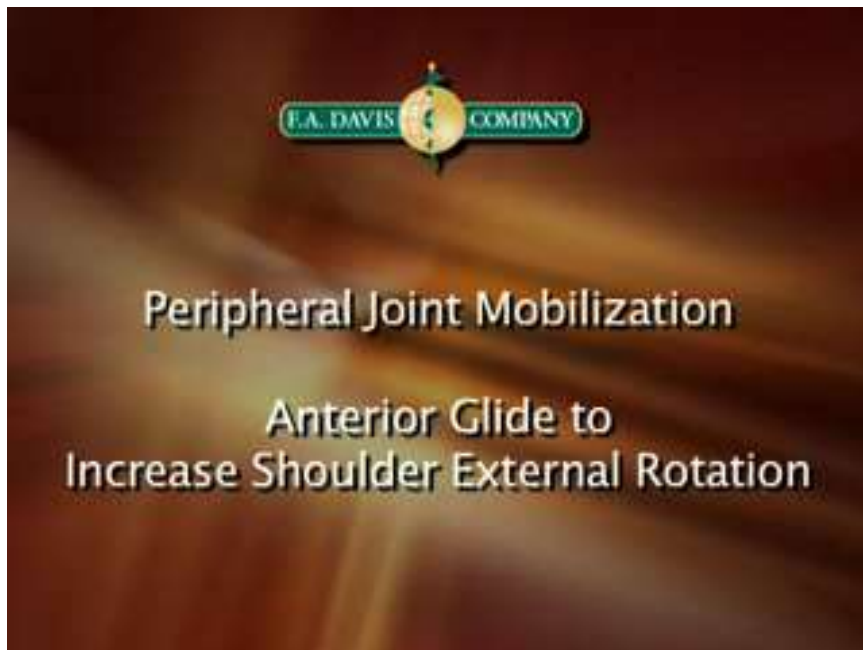
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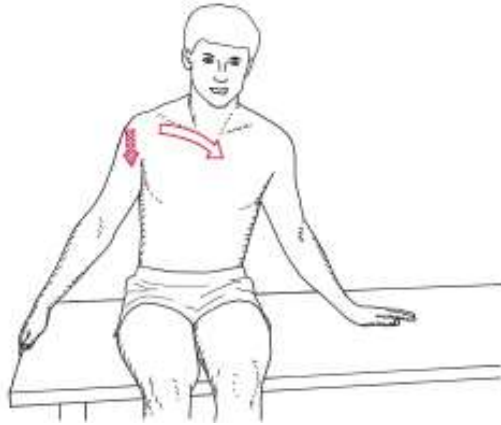
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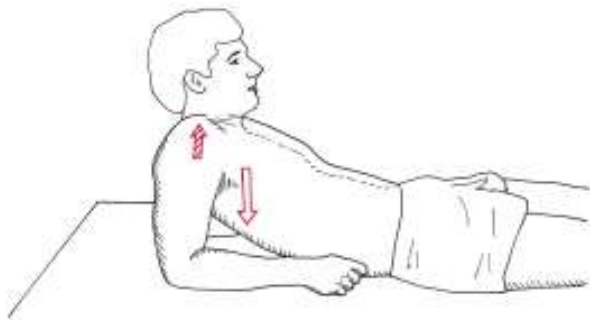
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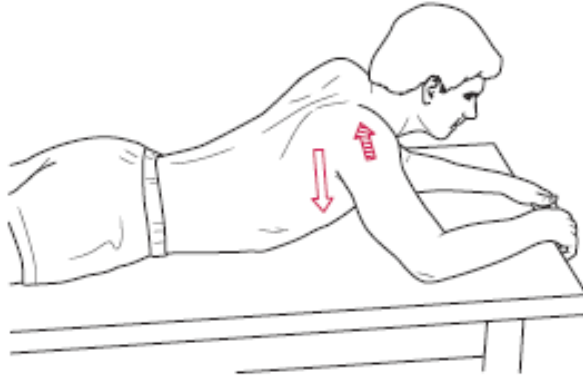
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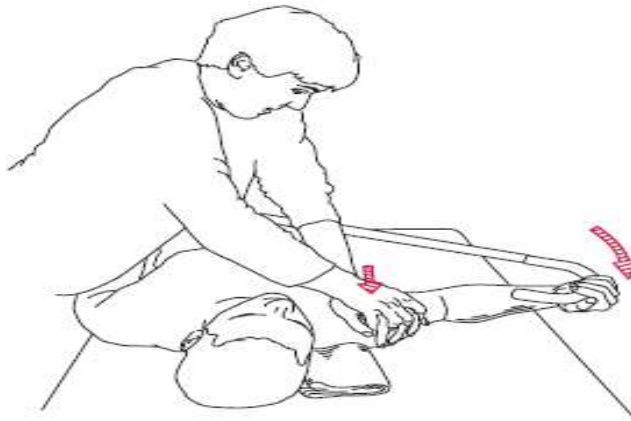
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Poor mechanics with the patient hiking the shoulder while attempting to abduct the arm. This results in limited scapula upward rotation and increased superior humeral head translations.



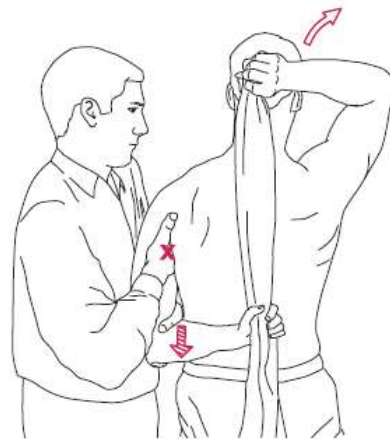
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Mobilization with movement (MWM) to improve GH joint external rotation. A posterolateral glide is applied to the humeral head while the patient pushes the arm into the end-range of external rotation with a cane.



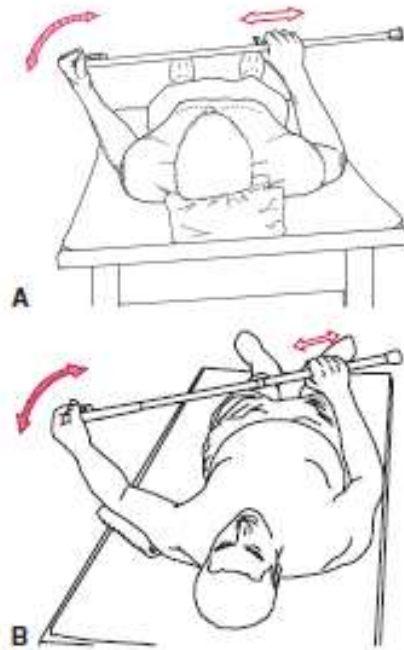
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MWM to improve GH joint internal rotation. An inferior glide is applied to the humerus while the patient pulls the hand up the back with a towel.



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Self-assisted shoulder rotation using a cane
(A) with the arm at the side and **(B)** in scaption. To relieve stress on the anterior capsule, elevate the distal humerus with a folded towel



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- Pendulum exercises. For gentle distraction, no weight is used. Use of a weight causes a grade III (stretching) distraction force



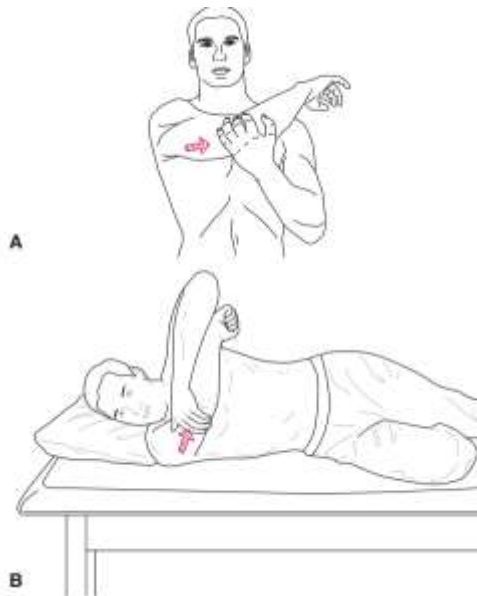
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- Gear shift exercise. Self-assisted shoulder rotation using a cane. Flexion/extension and diagonal patterns also can be done.



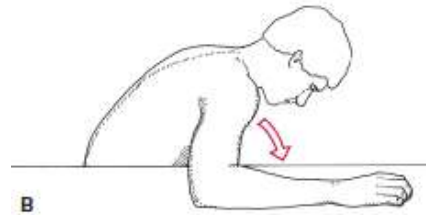
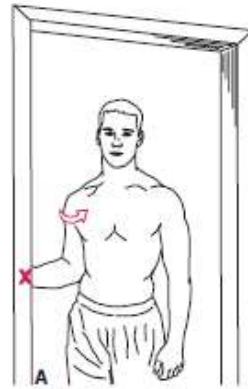
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- Self-stretching to increase horizontal adduction in standing **(A)**, and in the “sleeper position” to stabilize the scapula **(B)**.



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- Self-stretching to increase external rotation of the shoulder **(A)** with the arm at the side using a doorframe and **(B)** with the arm in the plane of the scapular using a table to stabilize the forearm.



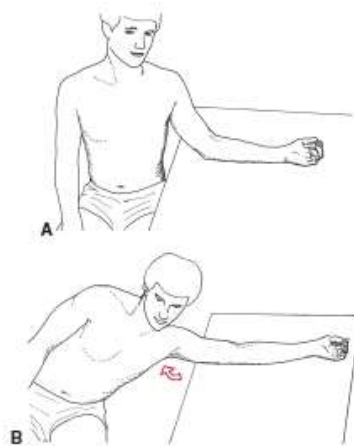
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- Self-stretching in the “sleeper position” to increase internal rotation of the shoulder using a table to stabilize the humerus.



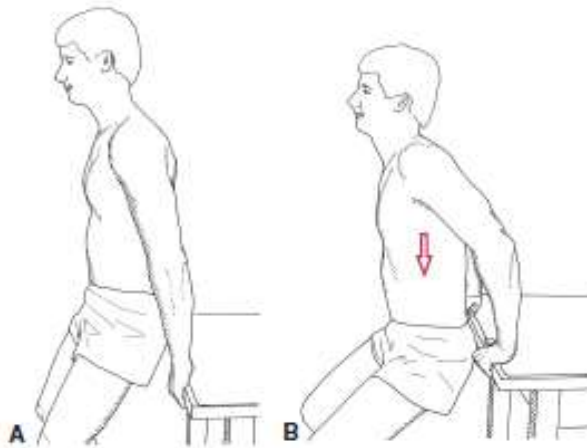
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- **(A)** Beginning and **(B)** end positions for self-stretching to increase shoulder abduction with elevation



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- **(A)** Beginning and **(B)** end positions for self-stretching to increase shoulder extension

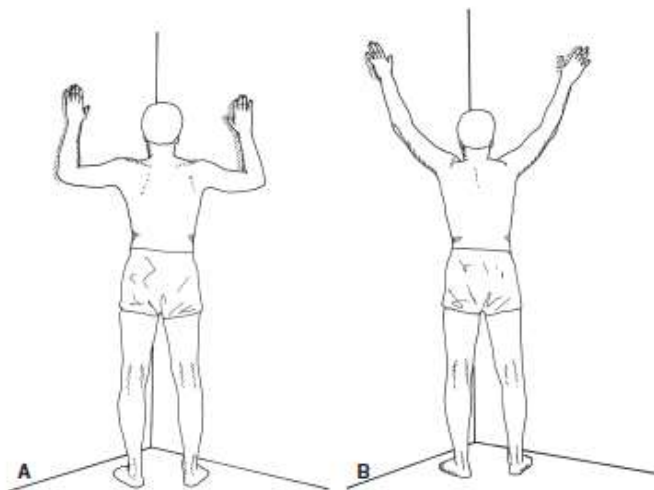


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- Active stretching of the pectoralis major muscle. The therapist gently pulls the elbows posteriorly while the patient breathes in and then holds the elbows at the end point as the patient breathes out.



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- Self-stretching the pectoralis major muscle with the arms in a reverse-T position to stretch **(A)** the clavicular portion and in a V-position to stretch **(B)** the sternal portion.

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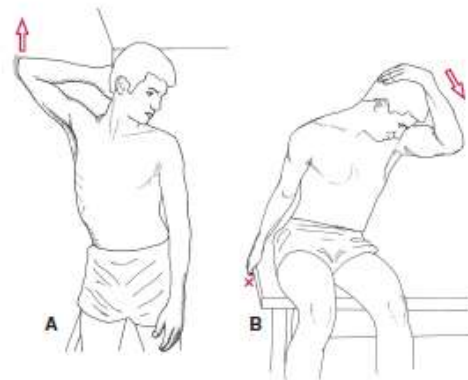
Wand exercises to stretch the pectoralis major

- Active stretching of the pectoralis minor muscle. The therapist holds the scapular and coracoid process at the end point as the patient breathes out



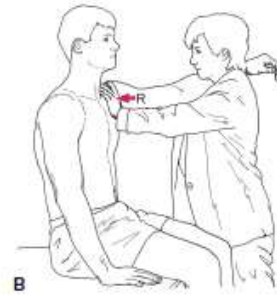
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- Self-stretching of the levator scapulae muscle
(A) using upward rotation of the scapula and **(B)** using depression of the scapula.



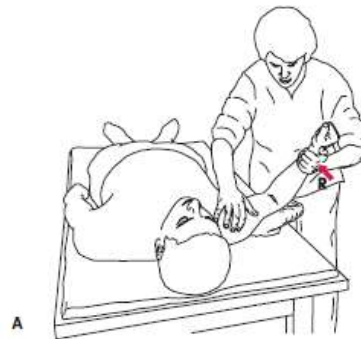
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- Self-stretching of the upper trapezius muscle



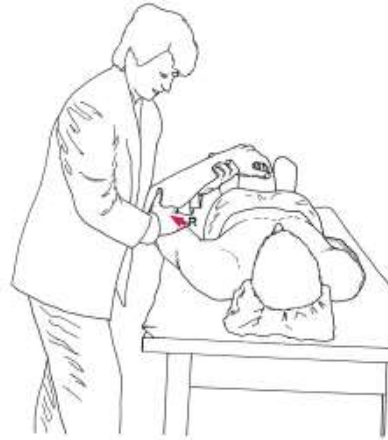
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- Isometric or dynamic resistance to shoulder rotation. **(A)** External rotation with the shoulder in the plane of the scapula. **(B)** Internal rotation with the shoulder at 90° abduction



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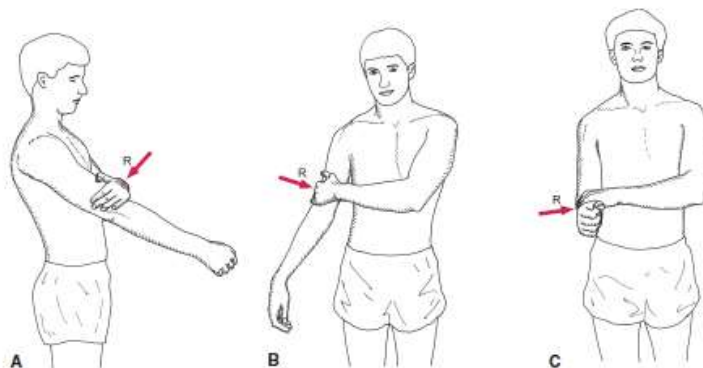
- Isometric resistance in scapular plane elevation. The shoulder is positioned between 30° and 60° degrees of elevation, and controlled manual resistance is applied against the humerus



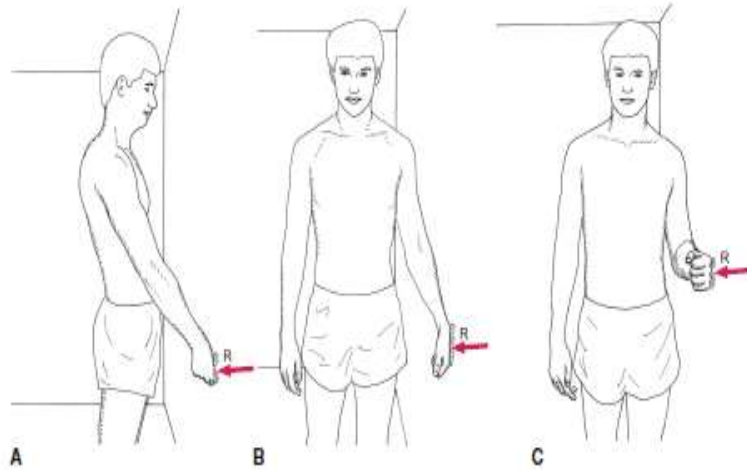
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Multiple angle isometrics, stabilization

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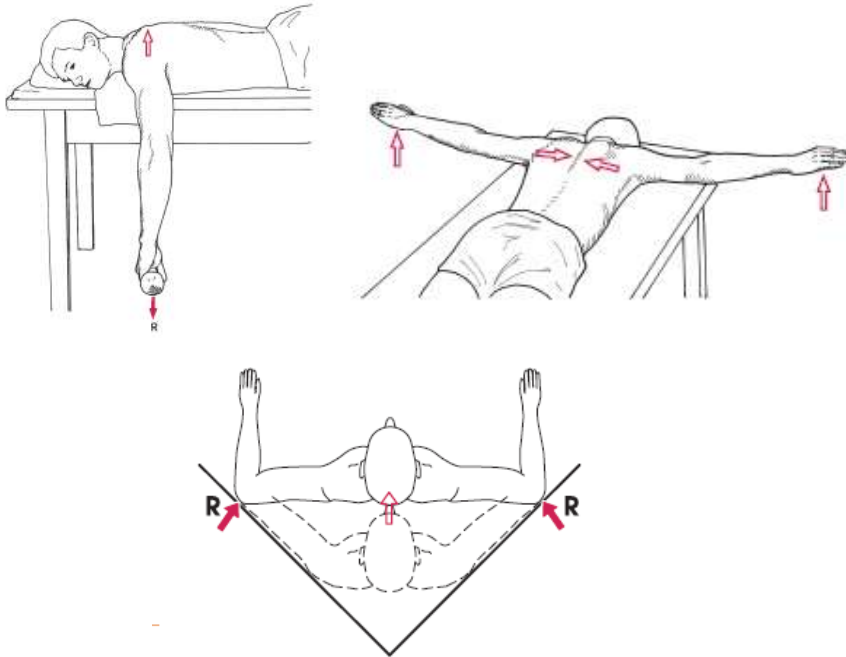


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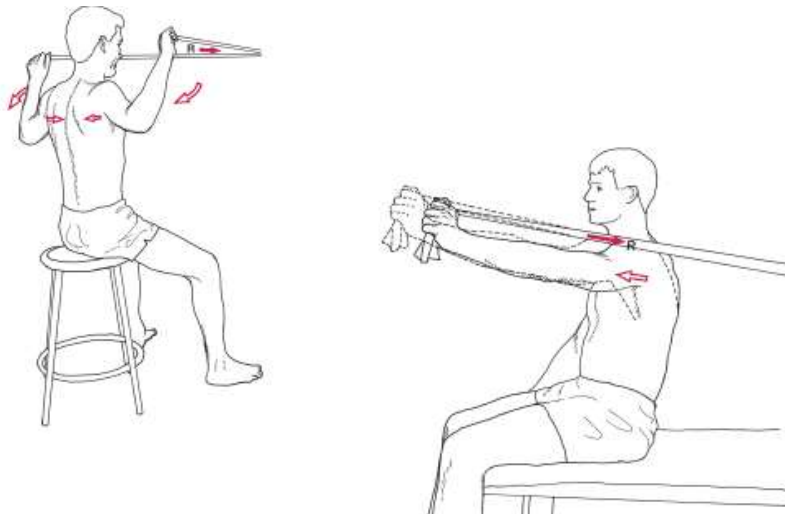
- Stabilization exercises. The patient stabilizes with the shoulder girdle musculature (isometrically) against the resistance imposed by the therapist. Resistance to flexion/extension, abduction/adduction, and rotation is applied in a rhythmic sequence.



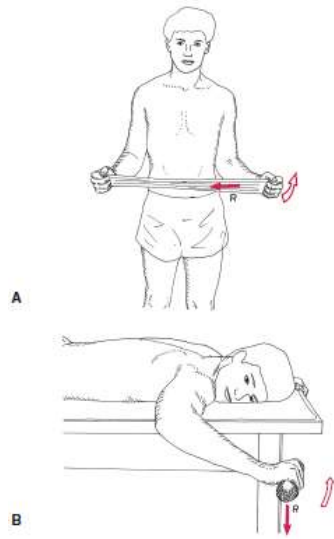
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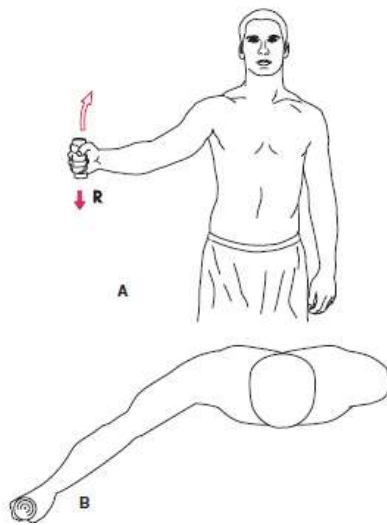
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- Finally, it is important to note some precautions with general exercises routinely performed in health clubs. I recommend the following suggestions to prevent rotator cuff problems: ? Avoid lat pull downs and military presses behind the head, as they place the shoulder in a poor biomechanical position encouraging impingement.
- ? Do not lower the bar or dumbbells below parallel with incline/flat bench press for the aforementioned reason.

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- ? Refrain from using too much weight with lateral shoulder raises. This exercise increases the load on the shoulder to 90% of the body weight, so there is no need to use heavy weight. It is best to maintain an arc of movement slightly in front of the body with lateral raises to decrease stress on the rotator cuff, while avoiding elevation above 90 degrees.

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- ? Specific rotator cuff exercises can be incorporated into upper body workouts. Perform 2 sets of 15-25 repetitions for each exercise. These exercises should be done no more than three times per week to avoid overtraining.

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1. anterior approach using a deltopectoral incision that extends from the AC joint to the deltoid insertion for adequate surgical exposure;
- (2) release (tenotomy) of the subscapularis tendon from its proximal attachment on the lesser tuberosity;
- (3) anterior capsulotomy;
- (4) exposure of the humeral head for a humeral osteotomy; and
- (5) preparation of the humeral canal for insertion of the prosthetic implant. The glenoid fossa is either débrided or contoured to accept the implant for a TSA. After component placement, the subscapularis is then reattached and may be lengthened if external rotation ROM is limited

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Total shoulder arthroplasty



Glenohumeral Joint Surgery and Postoperative Management

- ❑ Severe deterioration of one or both surfaces of the GH joint or an acute or nonunion fracture of the proximal humerus often must be managed with surgical intervention.
- ✓ Underlying pathologies that cause advanced joint destruction include late-stage OA, RA, traumatic arthritis, cuff tear arthropathy, and osteonecrosis (avascular necrosis) of the head of the humerus.

Total shoulder arthroplasty



Reverse shoulder arthroplasty



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Complications Specific to Glenohumeral Arthroplasty

Postoperative Complications Related to the Implants

- After TSA mechanical (aseptic) loosening, premature wear, or fracture of the polyethylene glenoid implant
 - Most often seen in a rotator cuff-deficient shoulder
 - Due to excessive stresses at the bone-prosthesis interface
 - Low incidence with unconstrained designs but higher with early-generation constrained designs
- Loosening of the humeral prosthesis after hemiarthroplasty

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Postoperative Management

✓ **Integrity of the rotator cuff**

The rehabilitation program with an intact RC can be progressed more rapidly

Emphasis to restore Mobility

- With repair focus is on stability

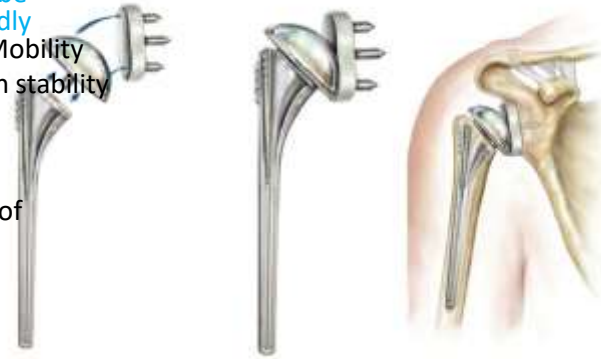
✓ **Intraoperative ROM**

unconstrained TSA

140° to 150° of shoulder elevation and 45° to 50° of external rotation

Posture

kyphosis and scapular



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Immobilization and Postoperative Positioning

BOX 17.3 Positioning After Shoulder Arthroplasty: Early Postoperative (Maximum Protection) Phase

Supine

- Arm immobilized in sling that is worn continuously
 - Elbow flexed to 90°
 - Forearm and hand resting on abdomen
- Arm supported at the elbow on a folded blanket or pillow slightly away from the side and anterior to the midline of the trunk
 - Forward flexion (10° to 20°), slight abduction, and internal rotation of the shoulder
 - Head of bed elevated about 30°

Sitting

- Arm supported in sling or resting on a pillow in the patient's lap or on the armrest of a chair

With Tenuous Rotator Cuff Repair

- In some cases, if a sling does not provide adequate protection of a repaired cuff, an abduction splint must be worn

Initially, the immobilizer is removed only for exercise and bathing. A Pt without repair of RC :quick sling removal > prevent postoperative stiffness.

However, a patient who has undergone a cuff repair or other soft tissue reconstruction may need to wear the sling while in crowded areas or during sleep for approximately **4 to 6 weeks** to protect the repaired tissues until sufficient healing has occurred

A patient who has undergone an rTSA wears a shoulder immobilizer continuously for 3 to 4 weeks Post OP except for daily personal hygiene and periodic PROM during the day

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Exercise: Maximum Protection Phase

- pain relief is the primary goal of shoulder arthroplasty, with improvement in functional mobility a secondary goal.
- Precautions during the first 4 to 6 weeks after TSA
- The maximum protection phase of rehabilitation following TSA begins on the first postoperative day and extends for 4 to 6 weeks

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BOX 17.4 Precautions for the Maximum Protection Phase of Rehabilitation Following Shoulder Arthroplasty

Exercise

- Short but frequent exercise sessions (four or five times per day).
- Low number of repetitions per exercise.
- Only passive or assisted shoulder ROM exercises and only within the "safe" limits of ranges noted during surgery. *Absolutely no end-range stretching.*
- Passive external rotation to neutral after rTSA or to less than 30° after TSA to avoid excessive stress to the surgically repaired subscapularis muscle.
- During passive or assisted shoulder rotation with the patient lying supine, position the humerus slightly anterior to the midline of the body (by placing the arm on a folded towel) to avoid excessive stress to the anterior capsule and suture line.
- No hyperextension or horizontal abduction (beyond neutral) of the shoulder to avoid stress to the anterior capsule.
- No combined extension, adduction, and internal rotation
- If an overhead rope-pulley system is used for assisted elevation of the arm, initially have the patient face the doorway and pulley apparatus; so shoulder elevation occurs only within a limited range.
- Maintain an erect trunk during passive or assisted elevation of the arm while sitting or standing to avoid subacromial impingement of soft tissues.

- In most instances, no active (unassisted), antigravity, dynamic shoulder exercises, particularly resisted internal rotation.
- No resistance (strengthening) exercises.
- In general, a more gradual progression of exercises following rTSA and for a patient with a severely damaged and repaired or irreparable rotator cuff mechanism who underwent TSA than for a patient with a preoperatively intact cuff.

Activities of Daily Living

- Limit activities to those that can be performed with the elbow at waist level, such as eating or writing.
- Avoid reaching behind the back to tuck in a shirt, reach into a back pocket, or following toileting.
- Avoid weight bearing on the operated extremity, such as pushing during transfers or when moving in bed, especially the first few weeks after surgery.
- Avoid lifting objects with the operated arm.
- Support the arm in a sling during extended periods of standing or walking.
- Wear the sling while sleeping or outside in crowded areas.
- No driving for 4 to 6 weeks.

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Goals and interventions

- ■ **Control pain and inflammation.**
 - Use a sling or splint for comfort.
 - Use prescribed analgesic and anti-inflammatory medication.
 - Use cryotherapy, especially after exercise
- ■ **Maintain mobility of adjacent joints.**
 - Active movements of the spine and scapula shoulder rolls
- Active ROM of the hand, wrist, and elbow when the arm is removed from the sling.

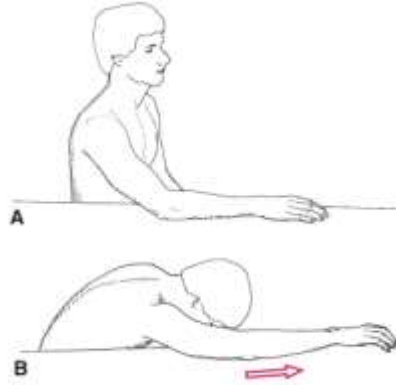
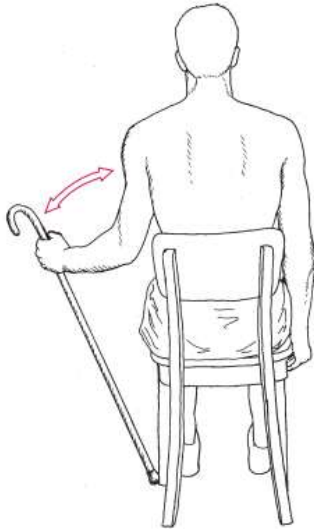


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Restore shoulder mobility

- Passive or therapist-assisted shoulder motions perform elevation of the arm in the plane of the scapula to tolerance, external rotation to no more than 30° to 45°, and internal rotation until the forearm rests on the chest **Codman's) exercises.** **periodically remove the sling and swing the arm gently during ambulation at home.** progress to *supine self-assisted* shoulder ROM (elevation and rotation)
- **Self-assisted shoulder ROM with a wand in sitting or standing position**
 Self-assisted reaching movements (to the nose, forehead, or over the head as comfort allows) to simulate functional movements.
 For some patients, transition to *active (unassisted)* shoulder ROM is often possible by 4 Wk.
 - Functional activities with the elbow at waist level, such as hand to face and writing, are permissible
- **Postpone Isometrics 4-6wks**

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- Following rTSA, patients have a lifting limit of 1 lb or less for 6 weeks, and external rotation and elevation ROM are limited to 0° to 20° and 90° to 120°, respectively, for 3 months. In addition, hyperextension, lifting, and supporting of body weight with the involved shoulder are all precautions following rTSA

For first 12 weeks:

- Observe ROM restrictions during functional activities
 - Do not reach behind the back or into hip pocket
 - When supine, support arm on pillow to avoid GH extension past neutral
- By 5–7 weeks light ADL permitted with elbow at waist level (writing, eating, washing face)
- Do not lean on involved arm (rising from or sitting down in chair)
- Restrict lifting with operated arm for 12–16 weeks (no heavier than cup of coffee or glass of water)

After 12–16 weeks

- Limit *unilateral* lifting to 6 lb
- Ultimate *bilateral* lifting limit: 10–15 lb
- Gradual return to light functional activities

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Criteria to progress. Criteria to advance to the second phase of rehabilitation following TSA are:

- ROM: At least 90° of passive elevation, at least 45° degrees of external rotation, and 70° of internal rotation in the plane of the scapula with minimal pain²¹⁵ or *almost* full, passive shoulder motion based on intraoperative measurements with little to no pain.^{34,99}
- No pain during resisted, isometric internal rotation of the subscapularis.³⁴
- Ability to perform most waist-level activities of daily living (ADLs) without pain.⁹⁹
- For rTSA, criteria include tolerance of assisted ROM and demonstration of the ability to isometrically activate the deltoid and periscapular musculature while the joint is positioned in the scapular plane.²⁰

89

Exercise: Moderate Protection/Controlled Motion Phase (4-6wk to12-16wk)

- Focuses on gradually establishing active (unassisted) control, dynamic stability, and strength of the shoulder while continuing to increase ROM
- During this phase of rehabilitation, it is safe to place increasing stresses (stretching or resistance) on periarticular soft tissues, it is important to do so gradually so as not to irritate tissues that are continuing to heal.
- Therefore, continue with short but frequent exercise sessions and avoid vigorous stretching or resistance exercises or overuse of the involved shoulder during functional activities

90

- **Continue to increase ROM of the shoulder.**

- Transition from passive or assisted ROM to *low-intensity, pain-free* stretching in all anatomical and diagonal planes of motion to achieve intraoperative ROM.

- Gentle joint mobilization techniques for specific capsular restrictions.

- In addition to therapist-assisted stretching, teach the patient how to perform gentle self-stretching exercises to increase elevation, internal/external rotation, extension, and horizontal adduction/abduction.



- ✓ antigravity abduction without substituting scapula elevation. Scapular and GH joint stabilization exercises (non Wt to min wt)
- ✓ For patients who have had an rTSA, maintain non weightbearing precautions for up to 12 weeks postoperatively

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- Pain-free, low-intensity (submaximal) resisted isometrics of shoulder muscles
- Begin dynamic resistance exercises for the scapula and shoulder musculature (between 0° and 90° of shoulder elevation) using light weights or light-grade elastic resistance. Begin in the supine position to support and stabilize the scapula and progress to the sitting position
- upper extremity endurance training with a stationary ergometer or a portable reciprocal exerciser on a table

Criteria to progress.

- Full, passive ROM of the shoulder (based on intraoperative ranges) or pain-free, passive or assisted shoulder flexion of at least 130° to 140° and abduction of 120°.
- In the plane of the scapula, at least 60° pain-free, passive external rotation and 70° internal rotation. Active (unassisted), antigravity elevation of the arm to
 - ✓ at least 100° to 120° in the plane of the scapula while maintaining joint stability and using appropriate shoulder mechanics
 - ✓ 4/5 strength of rotator cuff and deltoid muscles.

92

Exercise: Minimum Protection/Return to Function Phase

- Pain-free strengthening of the shoulder muscles for dynamic stability and functional use of the upper extremity for progressively more demanding tasks are the primary focuses of this phase
 - End-range self-stretching.
 - Pain-free, low-load, high-repetition progressive resistive exercise (PRE)
 - Closed-chain
Use of the involved upper extremity for lifting, carrying, pushing, or pulling activities against increasing loads.

Use of the operated upper extremity for progressively more advanced functional activities.

- Recreational activities, such as swimming and golf are possible.
- Modification of high-demand, high-impact work-related or recreational activities to avoid imposing excessive forces on the GH joint that could lead to loosening or premature wear of prosthetic implants

93

Total Shoulder Arthroplasty (Intact Rotator Cuff)	
Progression of rehab	Phase 1: postop weeks 0–4 Phase 2: postop weeks 4–12 Phase 3: postop weeks 12+
Immobilization	<ul style="list-style-type: none"> ■ No immobilizer unless rotator cuff repaired ■ Sling worn for comfort when shoulder unsupported and when in crowded, public areas or during sleep for about 4 weeks ■ Sling removed for exercise soon after surgery as directed by surgeon
ROM restrictions	<p><i>Limit from 0–4 weeks:</i></p> <ul style="list-style-type: none"> ■ Elevation of the arm: up to 120° ■ External rotation up to 30° (arm at side) <p><i>Limit for 4–6 weeks:</i></p> <ul style="list-style-type: none"> ■ No GH extension past neutral <p><i>After 6–12 weeks:</i></p> <ul style="list-style-type: none"> ■ Combined adduction, internal rotation, extension permitted

94

ROM exercises, stretching, and joint mobilization	<p><i>During Phase 1:</i></p> <ul style="list-style-type: none"> ■ Grade I/II joint oscillations ■ AROM: scapula and distal extremity joints only ■ Pendulum exercises ■ PROM→A-AROM GH joint <ul style="list-style-type: none"> —Perform in <i>supine</i> (0–3 weeks) —Progress to A-AROM in sitting and standing ■ AROM of GH joint by 4–6 weeks ■ No active internal rotation for at least 6 weeks (to protect subscapularis repair) <p><i>During Phase 2:</i></p> <ul style="list-style-type: none"> ■ Continue AROM ■ Gradually increase GH rotation ■ Gentle stretching after 6–8 weeks, if needed 	<p><i>During Phase 3:</i></p> <ul style="list-style-type: none"> ■ Progress end-range self-stretching
Resistance exercises	<p><i>During Phase 1:</i></p> <ul style="list-style-type: none"> ■ Only light, NWB isometrics of ST and deltoid muscles with shoulder in scapular plane <p><i>During Phase 2:</i></p> <ul style="list-style-type: none"> ■ Emphasis on improving function of rotator cuff and ST muscles ■ Submaximal isometrics of GH muscles combined with light weight bearing (closed-chain) through UE ■ Delay resisted rotation for several weeks (to protect repaired rotator cuff) ■ Progress to low-resistance dynamic strengthening of elbow and wrist; ST and GH joints if mechanics during AROM allow <p><i>During Phase 3:</i></p> <ul style="list-style-type: none"> ■ Progress PRE in functional patterns ■ Progress closed-chain stabilization exercises 	

95

ADL precautions	<p><i>For first 4 to 6 weeks:</i></p> <ul style="list-style-type: none"> ■ Observe ROM restrictions: <ul style="list-style-type: none"> —Do not reach behind the back or into hip pocket —When supine, support arm on pillow to avoid GH extension past neutral —Light ADL permitted with <i>elbow at waist level</i> (writing, eating, washing face) ■ Do not lean on involved arm (rising from or sitting down in chair) ■ Lifting limit: 1 lb (cup of coffee or glass of water) <p><i>From 6–12 weeks:</i></p> <ul style="list-style-type: none"> ■ Limit <i>unilateral</i> lifting to 3 lb <p><i>After 12 weeks:</i></p> <ul style="list-style-type: none"> ■ Ultimate <i>bilateral</i> lifting limit: 10–15 lb ■ Gradual return to light functional activities
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96

Painful Shoulder Syndromes

- Mechanical compression and irritation of the soft tissues (rotator cuff and subacromial bursa) in the suprahumeral space is called *impingement syndrome* and is the most common cause of shoulder pain.

97

- Impingement syndromes are generally classified as *intrinsic or extrinsic*
- ✓ Intrinsic factors are those that compromise the **integrity of the musculotendinous structures** and include **vascular changes in the rotator cuff tendons, tissue tension overload, and collagen disorientation and degeneration** . These factors typically involve the articular side of the tendons and may progress to articular-side rotator cuff tears, seen most often in those **older than 40 years of age**.

98

- Extrinsic impingement is believed to occur as a result of mechanical wear of the rotator cuff against the anteroinferior one-third of the acromion in the suprahumeral space during elevation activities of the humerus

99

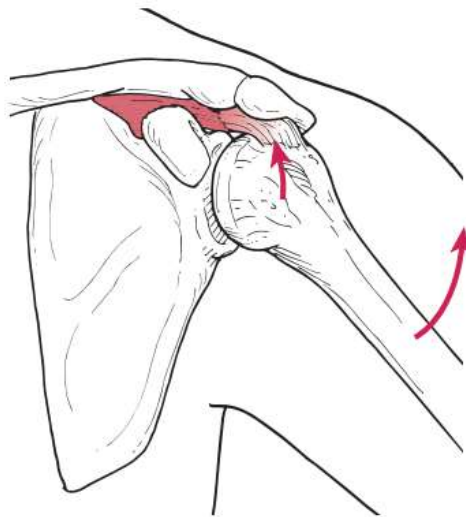


FIGURE 17.15 Decrease in the suprahumeral space during repetitive elevation activities leads to symptoms of impingement.

100

Primary extrinsic impingement

- anatomical or biomechanical factors.
- Anatomical factors
 - ✓ structural variations in the acromion or humeral head,
 - ✓ hypertrophic degenerative changes of the AC joint,
 - ✓ trophic changes in the coracoacromial arch or humeral head

101



102

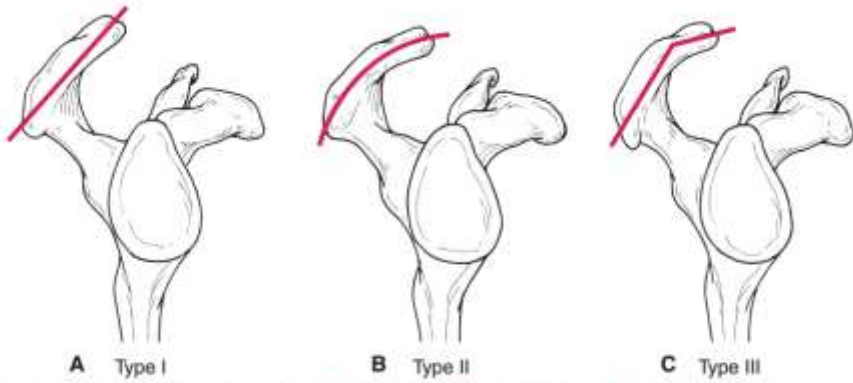
- Biomechanical factors include altered orientation of the clavicle or scapula during movement, or increased anterosuperior humeral head translations as may occur with a tight posterior GH capsule.

103

Secondary extrinsic impingement.

- Mechanical compression of the suprahumeral tissues due to **hypermobility or instability** of the GH joint and increased translation of the humeral head.
- This instability may be multidirectional or unidirectional

104



Classifications of the acromion by shape: **(A)** type I (flat); **(B)** type II (curved); **(C)** type III (hooked).

105



106

Common Activity Limitations and Participation Restrictions

- When acute, pain may interfere with sleep, particularly when rolling onto the involved shoulder.
- Pain with overhead reaching, pushing, or pulling.
- Difficulty lifting loads.
- Inability to sustain repetitive shoulder activities (such as reaching, lifting, throwing, pushing, pulling, or swinging the arm).
- Difficulty with dressing, particularly putting a shirt on over the head

107

Management: Painful Shoulder Syndromes

- **Management: Protection Phase**
 - Control Inflammation and Promote Healing**
 - Modalities and low-intensity cross-fiber massage are applied to the site of the lesion. While applying the modalities, position the extremity to maximally expose the involved region.
 - Support the arm in a sling for rest

108

Patient Education

The environment and habits that provoke the symptoms must be modified or avoided completely during this stage. The patient should be informed about the mechanics of the irritation and given guidelines for anticipated recovery with compliance.

109

Maintain Integrity and Mobility of the Soft Tissues

- Passive, active-assistive, or self-assisted ROM is initiated in pain-free ranges.
- Multiple-angle muscle setting and protected stabilization exercises are initiated. When exercising the shoulder, it is particularly important to stimulate the stabilizing function of the rotator cuff, biceps brachii, and scapular muscles at an intensity tolerated by the patient.

110

PRECAUTION

- It is important to use caution with exercises during this stage to avoid the impingement positions. Often, the mid-range of abduction, with internal rotation, or an end-range position when the involved muscle is on a stretch (such as putting the hand behind the back) provokes a painful response.

111

- **Control Pain and Maintain Joint Integrity**
Pendulum exercises without weights can be used to cause pain-inhibiting grade II joint distraction and oscillation motions

112

- **Develop Support in Related Regions**
 - Postural awareness and correction techniques are used.
 - Supportive techniques, such as shoulder strapping or scapular taping, tactile cues, and mirrors, can be used for reinforcement. Repetitive reminders and practice of correct posture are necessary throughout the day

113

Controlled Motion Phase

- **Patient Education**

Patient adherence to the program and avoidance of irritating the healing tissues are necessary. The home exercise program is progressed as the patient learns safe and effective execution of each exercise. Continue to reinforce proper postural habits.

114

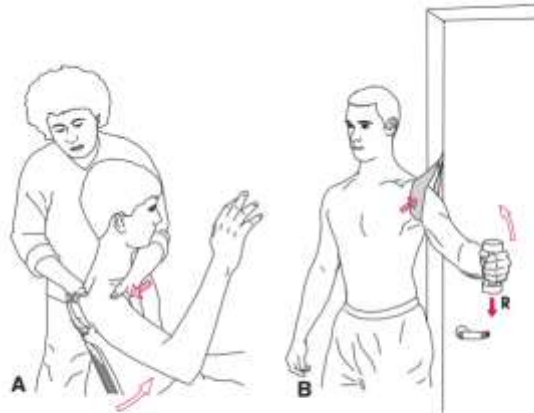


FIGURE 17.17 MWM to modify joint tracking and improve active elevation. A posterolateral glide is applied to the humeral head (A) manually or (B) with a belt for self-treatment, while the patient actively elevates the humerus. A weight is used to strengthen the muscles through the pain-free range.

115

- **Develop Strong, Mobile Tissues**
 - Manual therapy techniques, such as cross-fiber or friction massage, are used. The extremity is positioned so the tissue is on a stretch if it is a tendon or in the shortened position if it is in the muscle belly. The technique is applied to the tolerance of the patient.
 - Following massage, the patient is instructed to perform an isometric contraction of the muscle in several positions of the range. The intensity of contraction should not cause pain.
 - The patient should be taught how to self-administer the massage and isometric techniques.

116

Develop Balance in Length and Strength of Shoulder Girdle Muscles

It is important to design a program that specifically addresses the patient's impairments. Typical interventions in the shoulder girdle include but are not limited to:

- *Stretch shortened muscles.* Shortened muscles typically include the pectoralis major, pectoralis minor, latissimus dorsi and teres major, subscapularis, and levator scapulae.
- *Strengthen and train the scapular stabilizers.* Scapular stabilizers typically include the serratus anterior and lower trapezius for posterior tipping and upward rotation and the middle trapezius and rhomboids for scapular retraction.

It is important that the patient learns to avoid scapular elevation when raising the arm. Therefore, practice scapular depression when abducting and flexing the humerus.

- *Strengthen and train the rotator cuff muscles.* Place emphasis on the shoulder external rotators.

117

Develop Muscular Stabilization and Endurance



118

Progress Shoulder Function

- To increase coordination between scapular and arm motions, dynamically load the upper extremity within tolerance of the synergy with submaximal resistance.
To improve muscular endurance, have the patient increase control from 1 minute to 3 minutes.

119

Management: Return to Function Phase

- To increase muscular endurance, repetitive loading of the defined patterns is increased from 3 minutes to 5 minutes.
Develop Quick Motor Responses to Imposed Stresses
 - The stabilization exercises are applied with increased speed.
 - Plyometric training in both open-chain and closed-chain patterns is initiated if power is a desired outcome.

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121

Painful shoulder syndromes: Sub-acromial decompression

When pain and loss of functional mobility associated with **primary impingement (anatomical / bio mechanical)** do not resolve sufficiently with nonoperative management, *subacromial decompression*, **designed to increase the volume of the subacromial space and provide adequate gliding room for tendons**, is often warranted.

Subacromial decompression also is referred to as *anterior acromioplasty or decompression acromioplasty.*

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Indications

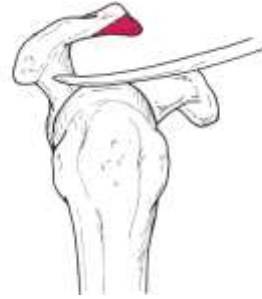
- Pain during overhead activities and loss of functional mobility of the shoulder as the result of primary impingement that persists (typically for 3 to 6 months or longer) despite a trial of nonoperative interventions.
- boney alterations of the subacromial compartment, calcific deposits in the cuff tendons, and symptomatic subacromial crepitus
- Intact or minor tear of the rotator cuff.

123

Patients who present with secondary impingement (GH joint hypermobility or instability associated with a partial or full-thickness tear of the rotator cuff) are **not candidates for surgical subacromial decompression alone**. For these patients, subacromial decompression is combined with concomitant **repair of the cuff tear**; otherwise, the procedures inherent in subacromial decompression can **worsen GH instability**

124

procedure



- Open
- Arthroscopic
- Bursectomy (subacromial bursa which is typically thickened (enlarged) by chronic inflammation)
- Coraco acromial ligament release
- Acromioplasty (to enlarge sub acromial space)
- Osteophyte removal from AC + distal portion of clavicle

125

Post OP management

- *If the rotator cuff is intact preoperatively, rehabilitation after arthroscopic decompression progresses quite rapidly because the shoulder musculature is left intact during the procedure.*
- Selection of procedure

126

Immobilization



- Sling
- the arm positioned at the patient's side or in slight abduction ; the shoulder is internally rotated; and the elbow is flexed to 90°.
- For comfort about 1-2 weeks
- Removed for Ex 1st POD.

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Exercises in Max protection Phase

- Exercise
- POD to 3-4 wks
- Pain control
- Immediate & comfortable controlled assisted ROM of GHJ. Thus preventing adhesions of RC in sub acromial space
- **To attain full PROM by 4-6 wks Post OP.**

128

- Pt education
- **Active (unassisted) shoulder ROM is permissible as soon as motions are pain-free** and proper scapulothoracic and glenohumeral control can be maintained.
This may be possible **as early as 2 weeks** post surgery

129

Goals & intervention

- ***Control pain and inflammation.***
- Use of a sling when the arm is dependent.
- Use of cryotherapy and prescribed anti-inflammatory medication.
- Shoulder relaxation exercises.
- ***Prevent loss of mobility of adjacent regions.***
- Active ROM of the cervical spine, elbow, wrist, and hand.

130



131

- ***Develop postural awareness and control.***
- Active movement of the scapula with emphasis on retraction.
- Posture training, emphasizing cervical retraction, thoracic extension, scapula retraction and a neutral lumbo-pelvic complex.

132

Pain free shoulder mobility

- Assisted ROM *
- Initially guiding with the sound upper extremity and later a wand. Start in the supine position to provide additional stability to the scapula against the thorax and with the upper arm on a folded towel in slight abduction and flexion
- Active ROM* may be by 2 wks
- **Stretching the posterior shoulder structures in pain-free range using a cross-chest stretch into horizontal adduction. Postpone until next phase if painful.**

133

Prevent reflex inhibition and atrophy of shoulder girdle musculature

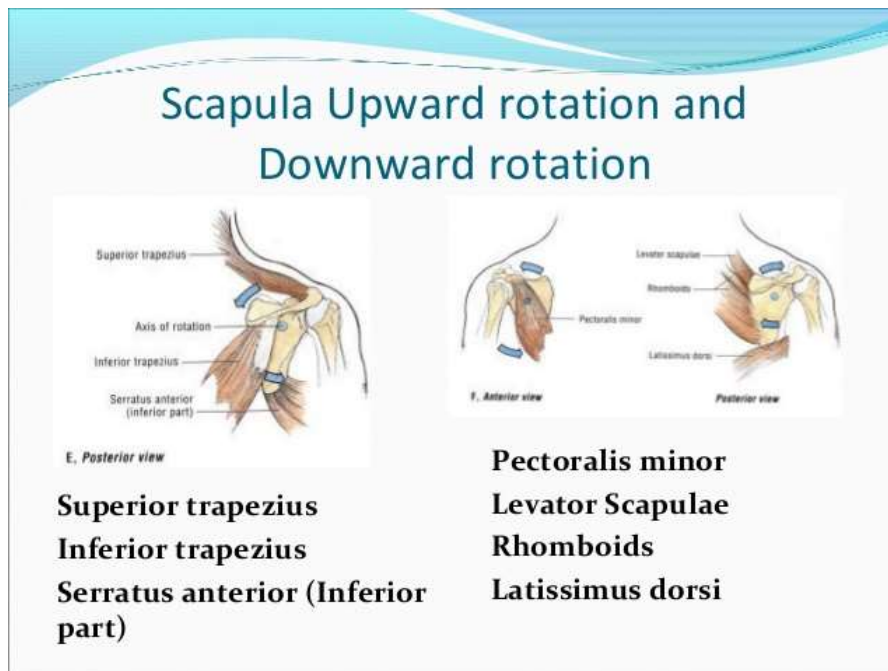
- *Pain-free*, low-intensity, multiple-angle isometrics of GH musculature with the arm supported and emphasis on the rotator cuff against minimal resistance.
- **Sub max isometric about a wk Post OP**
- Reps rather than R.
- Scap retractors & upward roators
- rhythmic stabilization exercises for scapulothoracic muscles

134

Criteria to progress. Criteria to advance to the second phase include

- Minimal discomfort In unsupported shoulder
- Full , pain free passive ROM of shoulder,150 degrees elevation, full mobility of scapula , IR/ER wnl.
- Supine ,pain free active elevation of arm
- pain free active
- Atleast 3/5 , preferably 4/5 of GHJ Ms.

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136

Moderate protection phase

- Aim full pain free active ROM
- Improving Neuromuscular control, RC
- Scapular stabilizers
- The patient may be ready to begin this phase of rehabilitation as early as 3 to 4 weeks postoperatively but more often by 4 to 6 weeks. This phase extends over a **4- to 6-week** period or until the patient meets the criteria to progress to the next phase.

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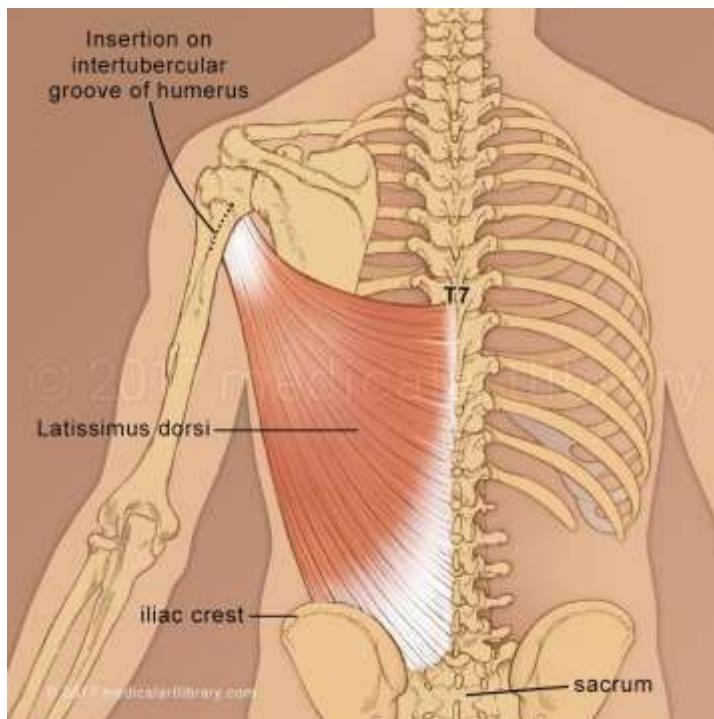
- ***Restore and maintain full, pain-free passive mobility of the shoulder girdle and upper trunk***
- ***Jt Mobs (Post & caudal + Scapulo Th jt)***
- ***Stretch of Ms restricting upward rotation of scapula***
- ***Stretch post capsule***
- ***Self stretch of upper trunk .***
- **levator scapulae, rhomboids, middle trapezius, subscapularis, latissimus dorsi, and pectoralis major and minor. Recall that tightness of these muscles may contribute to subacromial impingement during overhead movements of the arm.**

138

- Postural awareness & control
- Dynamic stability , strength , ST & GH Ms
- Stabilization exercises against increasing resistance and in weight-bearing positions. Emphasize isolated strengthening of the serratus anterior and trapezius muscles.
 - Upper extremity ergometry for muscular endurance. To avoid an impingement arc, initiate in a standing position rather than while seated.
- Low load R of shoulder Ms (1-5 lb.) resisted arm elevation in supine>sit > stand

Latissimus dorsi , teres major & biceps brachi : humeral dep

139



140

- **PRECAUTION:** Be certain the patient can perform active shoulder flexion and abduction against gravity without elevating the scapula before progressing to resisted exercises above shoulder level

141

Criteria for return to function

- -ve impingement test
- Pain free ROM , no substitution
- 75% of Ms strength compared to sound side

142

- 8th wk Post OP
- 12-16 Wks
- Ex in which there is involvement of Maximal force in short interval of time ??
- Goal of increasing power

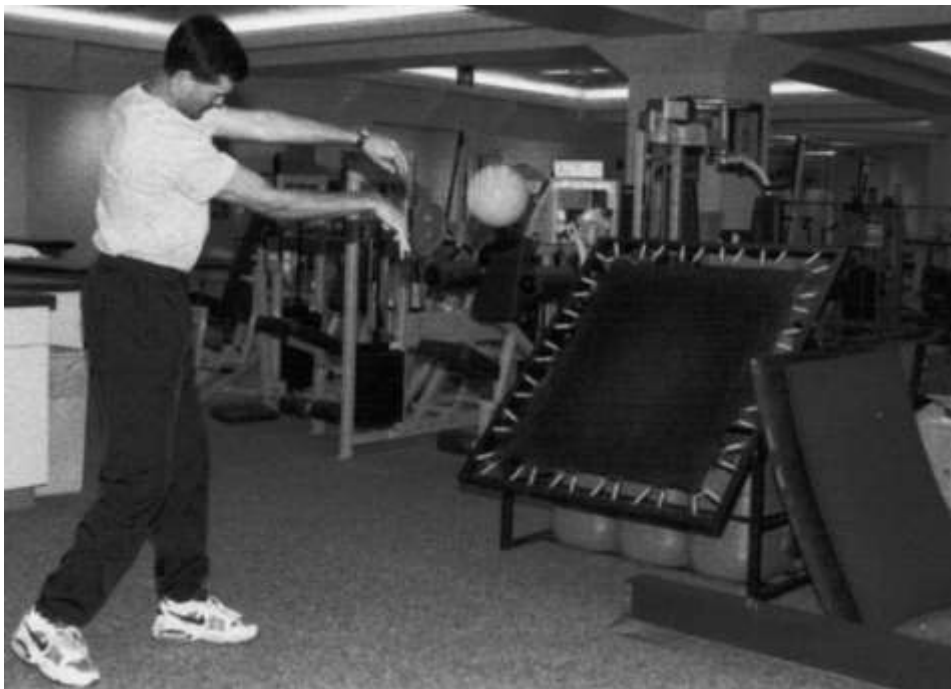
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