Acromioplasty

Surgical Indications and Considerations

Anatomical Considerations: Any abnormality that disrupts the intricate relationship within the subacromial space may lead to impingement. Both intrinsic (intratendinous) and extrinsic (extratendinous) factors have been implicated as etiologies of the impingement process. The unique anatomy of the shoulder joint sandwiches the soft tissue structures of the subacromial space (rotator cuff tendons, coracoacromial ligament, long head of biceps, bursa) between the overlying anterior acromion, acromioclavicular joint, coracoid process, underlying greater tuberosity of the humeral head and the superior glenoid rim.

Pathogenesis: When subacromial impingement is suspected it is necessary to differentiate primary from secondary impingement. This is essential for successful treatment. Primary subacromial impingement is the result of an abnormal mechanical relationship between the rotator cuff and the coracoacromial arch. Secondary impingement is a clinical phenomenon that results in "relative narrowing" of the subacomial space. This often results from glenohumeral or scapulothoracic joint instability. The loss of the stabilizing function of the rotator cuff also leads to an abnormal superior translation of the humeral head (decreased depression of the humeral head during overhead activity and less "clearance") and mechanical impingement of the rotator cuff on the coracoacromial arch. In patients who have scapular instability, impingement results from improper positioning of the scapula with relation to the humerus. The instability leads to the insufficient retraction of the scapula, which allows for earlier contact of the coracoacromial arch on the underlying rotator cuff.

Epidemiology: Patients with primary impingement are usually older than 40 years, complain of anterior shoulder and lateral upper arm pain, with an inability to sleep on the affected side. They have complaints of "shoulder weakness," and difficulty performing overhead activities. Patients with secondary impingement are usually younger and often participate in overhead sporting activities such as baseball, swimming, volleyball, or tennis. They complain of pain and weakness with overhead motions and may even describe a feeling of the arm going "dead."

Diagnosis

- History and physical examination are crucial in diagnosing subacromial impingement syndrome because findings may be subtle and symptoms may overlap with various differential diagnoses
- Physical examination focuses on shoulder and cervical spine. Cervical spine must be cleared to rule out cervical radiculopathy, degenerative joint disease, and other disorders of the neck contributing to referred pain in the shoulder.
- Primary impingement:
    - (+) Hawkins sign
    - (+) Neer impingement sign
    - Possible associated AC joint arthritis (tenderness to palpation and increased pain with horizontal adduction)

- Secondary impingement: look for associated pathology
    - GH instability: (+) apprehension and relocation test, load and shift
    - Abnormal scapular function: scapular winging, scapular dyskinesia
    - Posterior capsule tightness: leads to an obligatory translation of the humeral head and rotator cuff in an anterior and superior direction, which contributes to impingement problem.
- Radiographs are helpful in demonstrating acromial anatomy types, hypertrophic coracoacromial ligament spurring, acromioclavicular joint osteoarthritis, and calcific tendonitis.
- MRI can be helpful in revealing relationships in impingement syndrome, especially if rotator cuff tear and other internal derangement pathologies are suspected.

Nonoperative Versus Operative Management: Nonoperative treatment is very successful and the comprehensive rehabilitative protocols for primary and secondary impingement syndrome are similar and follow the postoperative rehabilitation plan for patients who have had a subacromial decompression with a normal rotator cuff. Initial goals of the rehabilitation process are to obtain pain relief and regain range of motion. Various modalities, oral medications and corticosteroid subacromial injections are helpful in the early stages to decrease the inflammatory process allowing for more successful advances in motion and strengthening. Strengthening exercises begin by avoiding impingement positions while performing the exercises. The focus is on closed kinetic chain exercises initially with open chain exercises to follow without aggravating shoulder discomfort. These exercises help to restore the ability of the rotator cuff to dynamically depress and stabilize the humeral head, resulting in a gradual relative increase in the subacromial space. Nonoperative treatment should be considered unsuccessful if the patient shows no improvement after 3 months of a comprehensive and coordinated medical and rehabilitative program. In addition, after 6 months of appropriate treatment, most patients have achieved maximal improvement from the nonoperative treatment program. The success of operative treatment is determined by the choice of an appropriate operative procedure and the skills of the surgeon. It is imperative to determine whether the patient has a primary or secondary impingement. For primary impingement the procedure of choice presently is arthroscopic subacromial decompression, although comparable long-term results can be obtained with a traditional open acromioplasty. Arthroscopic subacromial decompression has many advantages including the ability to evaluate the glenohumeral joint for associated labral, rotator cuff, and biceps pathology, as well as assessment of the acromioclavicular joint. Second, this technique produces less postoperative morbidity and is relatively noninvasive, minimizing deltoid muscle fiber detachment. However, arthroscopic subacromial decompression is a technically demanding procedure and the surgeon must be very skilled. When glenohumeral joint instability is the reason for secondary impingement, surgical treatment is a stabilization procedure.

Surgical Procedure: Many different arthroscopic techniques have been described, but one that is often recommended is the modified technique initially described by Caspari and Thaw. Using standard posterior portal, the surgeon inserts the arthroscope into the glenohumeral joint and evaluates for pathology including biceps tendon, labrum and rotator cuff. Any incidental pathology can be addressed arthroscopically at this time prior to subacromial space arthroscopy being performed. Starting from the posterior portal and using an aggressive synovial resector with the inflow in the anterior portal, the surgeon uses the lateral portal to perform a bursectomy

and debride the soft tissues of the subacromial space. This is done in a sequential manner, working from the lateral bursal area to the anterior and medial acromioclavicular regions. After the subacromial bursectomy and denudement of the undersurface of the acromion, the superior rotator cuff can be visualized along the acromioclavicular joint and anterior acromial anatomy is more easily defined. The surgeon must be careful not to disturb the coracoacromial ligament during the initial bursectomy procedure. Next the surgeon performs sequential acromioplasty with an acromionizer instrument with the therapeutic goal of a flat type I acromion and removal of the coracoacromial ligament from its bony attachment. In addition, the acromioclavicular joint may be assessed at this point and minimal inferior osteophytes may be excised. Lastly, dependent on preoperative evaluation the surgeon may choose to perform a distal clavicle excision (usually 1.5-2.0 cm). Surgical outcomes for arthroscopic subacromial decompression, partial acromioplasties, and distal clavical excisions have been favorable. Most surgical failures are associated with incomplete bone resection and not addressing acromioclavicular joint arthropathy.

POSTOPERATIVE REHABILITATION

Note: The following rehabilitation progression is a summary of the guidelines provided by Phillips and Tippet. Refer to their publication to obtain further information regarding criteria to progress from one phase to the next, anticipated impairments and functional limitations, interventions, goals, and rationales.

Postoperative rehabilitation can be divided into three phases:

1. Phase one emphasizes a return of range of motion
2. Phase two stresses regaining muscle strength
3. Phase three stresses endurance and functional progression

Phase I: *Return of range of motion:* Weeks 0-3

Goals: Days: 1-10
Control normal postoperative inflammation and pain
Prevent infection
Protect healing soft tissues
Minimize effects of immobilization and activity restriction

Days: 11-14
Flexion PROM to 150º
External/internal rotation PROM to functional levels
Supine AROM flexion to 120º

Intervention:

Phase I a & b (first 10 days post op)

- Cryotherapy
- Grip strengthing exercises
- Passive range of motion as indicated
- Isometrics (Submaximal to maximal internal and external rotation)
- Active range of motion (scapular retraction/protraction)
- Joint mobilizations (sternoclavicular and acromioclavicular joints as indicated)

Phase I c (11-21 days post op)

- Active range of motion:
    - External rotation (at 60º-90º abduction)
    - Supine flexion, scapular protraction
    - Sidelying external rotation
    - Prone scapular retraction
- Cardiovascular exercise, pool therapy
- Return to limited work duties (depending on job tasks)

Phase II: *Regaining muscle strength*: Weeks 3-8

Goals: Control any residual symptoms of inflammation and pain
Full PROM in all ranges
Symmetric flexion AROM
AROM flexion in standing to shoulder height without substitution
Emphasis on muscle strengthening with continued work on rotator cuff musculature and scapula stabilizer strengthening
Continue range of motion efforts if limited capsular extensibility detrimentally affects physiologic motion
Restoration of normal arm strength ratios (involved/uninvolved)
Return to previous levels of activities/sport
Prevention of poor throwing mechanics

Intervention:

- Progressive resistance exercises for rotator cuff musculature and scapular stabilizers
- Joint mobilizations as indicated
- Proprioceptive neuromuscular retraining
- Towards end of phase 2 begin progressive throwing program and gentle plyometrics

Phase III: *Endurance and Functional Progression:* Weeks 9-12

Goals: Unrestricted overhead work and sporting activity
Focus on enhancing kinesthesia and joint position sense
Muscular endurance
Performing work-specific and sport-specific tasks

Intervention:

- Exercises to improve both passive detection of shoulder movement and active joint repositioning for enhanced kinethesia and joint positioning sense
- Decreased weight with increased repetitions during strengthening exercises of rotator cuff and scapular stabilizers.
- Emphasis on timing of muscle contraction and movement without substitution (proprioceptive neuromuscular facilitation)
- Functional progression program involving a series of sport or work-specific basic movement patterns graduated according to the difficulty of the skill and the patient's tolerance.

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