

**Shoulder Injury
Medical Treatment Guidelines**

**Proposed by the
State of New York
Department of Insurance
to the
Workers' Compensation Board**



Shoulder Injury

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INTRODUCTION TO SHOULDER INJURY

This Guideline addresses the ten most common work-related injuries/syndromes/disorders to or involving the shoulder complex.

A. HISTORY TAKING AND PHYSICAL EXAMINATION provides information common to all injuries through a discussion of provider procedures which should be applied to each patient, regardless of the injury and diagnosis.

B. SPECIFIC DIAGNOSES, TESTING AND TREATMENT PROCEDURES provides information unique to each of the following work-related injuries/syndromes/disorders:

1. Acromioclavicular (AC) Joint Sprains/Dislocations
2. Adhesive Capsulitis/Frozen Shoulder Disorder
3. Bicipital Tendon Disorders
4. Brachial Plexus Injuries
 - I. Brachial Plexus
 - II. Axillary Nerve
 - III. Long Thoracic Nerve
 - IV. Musculocutaneous Nerve
 - V. Spinal Accessory Nerve
 - VI. Suprascapular Nerve
5. Bursitis of the Shoulder
6. Impingement Syndrome
7. Rotator Cuff Tears
8. Rotator Cuff Tendinitis

9. Shoulder Fractures
 - i. Clavicular Fracture
 - ii. Proximal Humeral Fracture
 - iii. Humeral Shaft Fracture
 - iv. Scapular Fracture
 - v. Sternoclavicular Dislocation/Fracture
10. Shoulder Instability

Each diagnosis is presented in the following format:

- a. History and Mechanism of Injury;
 - b. Discussion of relevant physical findings;
 - c. Laboratory tests;
 - d. Testing procedures;
 - e. Diagnosis-based, non-operative therapeutic treatment procedures;
 - f. Options for operative/surgical treatment; and
 - g. Options for post-operative rehabilitation/treatment procedures.
- C. MEDICATIONS** provide information common to all injuries through detailed discussions of referenced medications with indications for expected time to produce effect, frequency, and optimum and maximum durations.
- D. NON-OPERATIVE TREATMENT PROCEDURES** provides information common to all injuries through detailed discussions of referenced therapeutic procedures with indications for expected time to produce effect, frequency, and optimum and maximum durations.

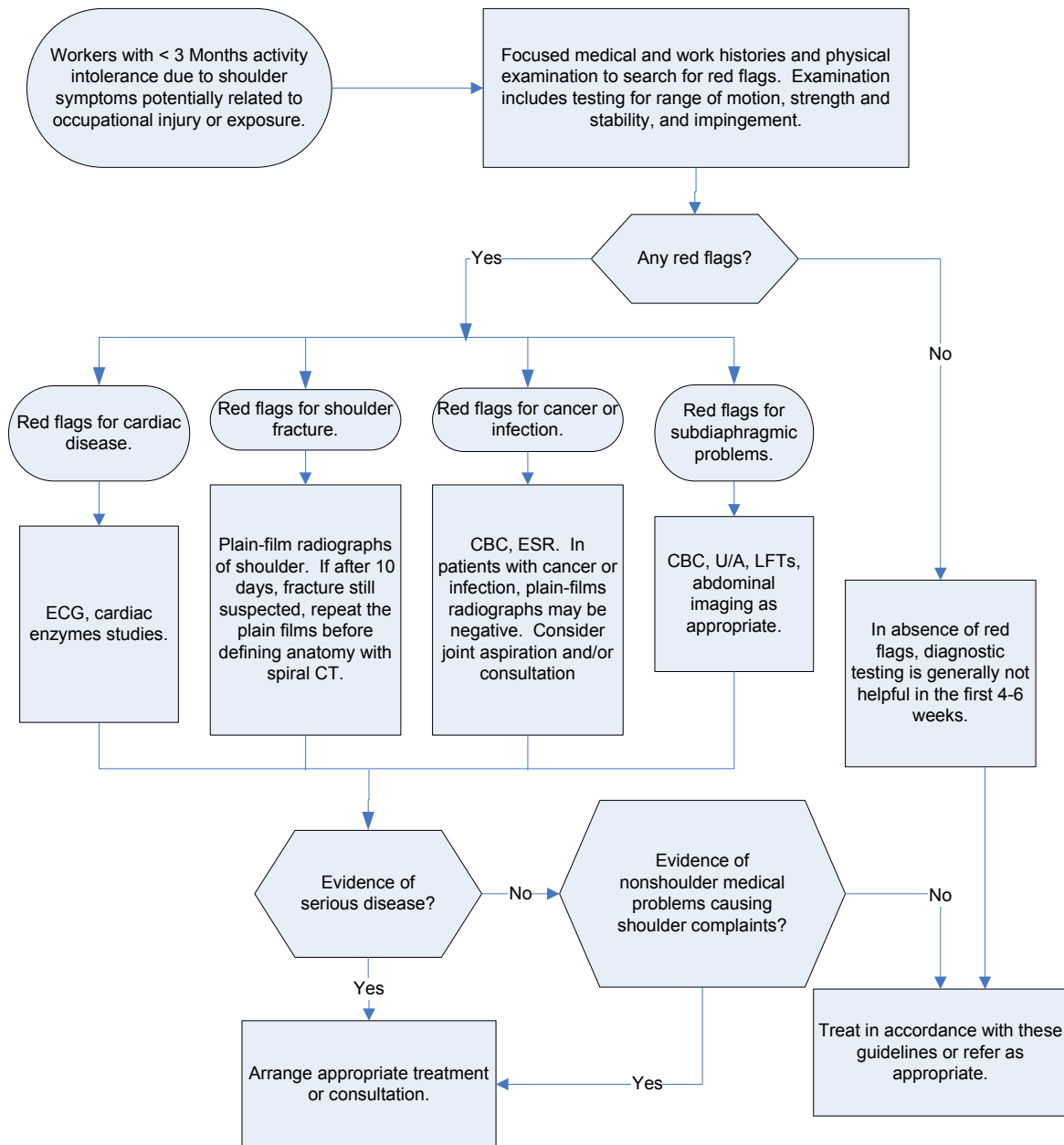
As shoulder injuries frequently involve a complex of problems, it is always necessary to consider the possible interaction of the various parts of the shoulder mechanism when proceeding with a diagnostic workup and a therapeutic treatment plan.

A. HISTORY TAKING AND PHYSICAL EXAMINATION

There are two standard procedures that should be utilized when initially diagnosing work-related shoulder instability. These procedures establish the foundation/basis for and dictate all other following stages of diagnostic and therapeutic procedures. When findings of clinical evaluations and those of other diagnostic procedures are not complementing each other, the objective clinical findings should have preference.

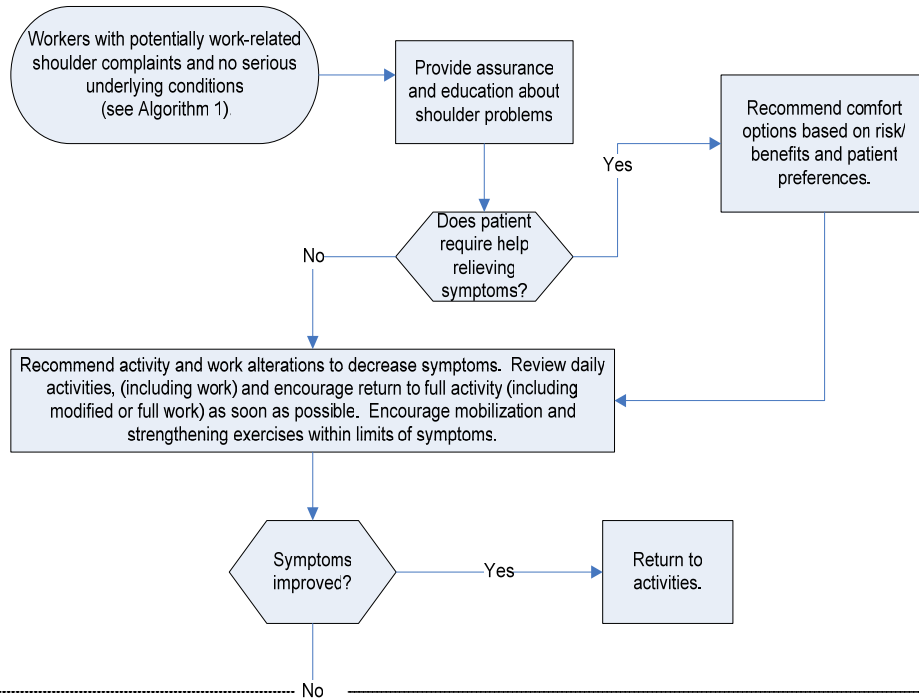
1. **HISTORY TAKING** should address at least the following for each shoulder injury diagnosis:
 - a. Thorough medical history.
 - b. Occupational relationship.
 - c. History of non-occupational injury and avocational pursuits need to be specifically documented.
 - d. Prior shoulder condition.
2. **PHYSICAL FINDINGS** are specific to and addressed within each shoulder injury diagnosis noted in this section. Given the complexity of the shoulder mechanism, an evaluation for concomitant injury should be considered.

Algorithm 1: Initial Evaluation Work-Related Shoulder Complaints

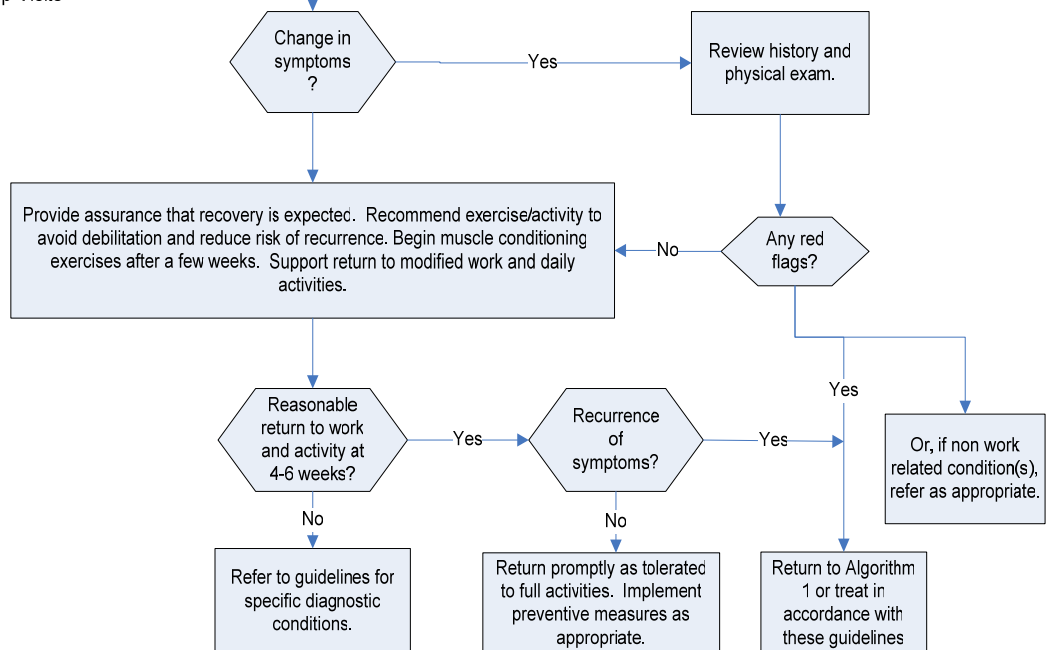


Algorithm 2: Initial and Follow-up Management of Work-Related Shoulder Complaints

Initial Visit



Follow-up Visits



B. SPECIFIC DIAGNOSES, TESTING AND TREATMENT PROCEDURES

1. **ACROMIOCLAVICULAR (AC) JOINT SPRAINS/DISLOCATIONS:** An acute acromioclavicular (AC) joint injury is frequently referred to as a shoulder separation.

Classification of Injury: The degree of clavicular displacement depends on the severity of injury to the AC and Coracoclavicular (CC) ligaments, the AC joint capsule, and the supporting muscles of the shoulder (trapezius and deltoid) that attach to the clavicle.

The traditional Allman and Tossy classification is a 3-grade classification scheme. Rockwood expanded that classification to 6 types of injury. The Rockwood Type I injury corresponds to the original Allman/Tossy Grade I; Rockwood Type II to the original Allman/Tossy Grade II and Rockwood Types III-VI are in the original Grade III Allman/Tossy category.

The Allman/Tossy classification and the corresponding Rockwood classification are illustrated in Table 1:

Table 1: Allman/Tossy – Rockwood Classification Systems

Allman	Rockwood
Grade I:	Type I: Partial disruption of the AC ligament and capsule.
Grade II:	Type II: Sprains consisting of a ruptured AC ligament and capsule with incomplete injury to the coracoclavicular (CC) ligament, resulting in minimal AC joint subluxation.
Grade III:	Type III: Separation or complete tearing of the AC ligament and/or CC ligaments, possible deltoid trapezius fascial injury, and dislocation of the AC joint.
	OR
	Type IV: Dislocation consisting of a displaced clavicle that penetrates posteriorly through or into the trapezius muscle.
	OR
	Type V: Dislocation consisting of complete separation of the AC and CC ligaments and dislocation of the AC joint with a large CC interval.
	OR
	Type VI: Dislocation consisting of a displaced clavicle that penetrates inferior to the coracoid.

Types I-III are common, while Types IV-VI are not and, when found, require surgical consultation. For AC joint degeneration from repetitive motion that is found to be work-related, see Impingement Syndrome.

- a. **History and Mechanism of Injury (AC Joint Sprains/Dislocations):**
- i. Mechanism of Injury (AC Joint Sprains/Dislocations): generally, patients sustain an AC joint injury when they land on the point of the shoulder, driving the acromion downward, or fall on an outstretched hand or elbow, creating a backward and outward force on the shoulder. It is important to rule out other sources of shoulder pain from an acute injury, including rotator cuff tear, fracture and nerve injury.
- b. **Physical Findings (AC Joint Sprains/Dislocations) may include:**
- i. Tenderness at the AC joint with, at times, contusions and/or abrasions at the joint area; prominence/asymmetry of the shoulder can be seen; and/or
- ii. One finds decreased shoulder motion and with palpation, the distal end of the clavicle is painful; there may be increased clavicular translation; cross-body adduction can cause exquisite pain.
- c. **Laboratory Tests (AC Joint Sprains/Dislocations)** are not indicated unless a systemic illness or disease is suspected.
- d. **Testing Procedures (AC Joint Sprains/Dislocations):**
- i. Plain x-rays may include:
- AP view;
 - AP radiograph of the shoulder with the beam angled 10° cephalad (Zanca view)
 - Axillary lateral views; and
 - Stress view; side-to-side comparison with 10-15 lbs. of weight in each hand.

e. **Non-operative Treatment Procedures (AC Joint Sprains/Dislocations) may include:**

- i. Procedures such as patient-directed thermal treatment and immobilization (up to 6 weeks for Type I-III AC joint separations). Immobilization treatments for Type III injuries are controversial and may range from a sling to surgery.
- ii. Medication, such as nonsteroidal anti-inflammatories and analgesics, would be indicated; narcotics are not normally indicated.

Subacromial space injection with steroids may be therapeutic if the patient responded positively to a diagnostic injection of an anesthetic. Steroid injections directly into the tendons are not recommended.

- Frequency: Not more than 2-3 times annually. Usually 1 or 2 injections adequate. A minimum of 3 weeks interval between injections is recommended.
 - Time to produce effect: Immediate with local anesthetic, or within 3 days with corticosteroids.
 - Maximum duration: Limited to 3 injections annually to the same site.
- iii. Manipulation may be indicated in a Type II sprain.
 - iv. Physical medicine interventions should emphasize a progressive increase in range of motion without exacerbation of the AC joint injury. With increasing motion and pain control, a strengthening program should be instituted and return to modified/limited duty would be considered at this time. By 8-11 weeks, with restoration of full or near-full motion, return to full duty should be anticipated.

f. **Operative Procedures (AC Joint Sprains/Dislocations):**

- i. With a Type III AC joint injury, an appropriate orthopedic consultation could be considered initially, but should be considered when conservative care fails to increase function.

- ii. With a Type IV-VI AC joint injury, an orthopedic surgical consultation is recommended.

g. Post-Operative Procedures (AC Joint Sprains/Dislocations):

Should be coordinated by the orthopedic and the primary care physician working with the interdisciplinary team. Keeping with the therapeutic and rehabilitation procedures found in this Shoulder Guide, the patient could be immobilized for 2-3 weeks, restricted in activities, both work-related and avocational, for 6-8 weeks while undergoing rehabilitation, and be expected to progress to return to full duty based upon his/her response to rehabilitation and the demands of the job.

- 2. ADHESIVE CAPSULITIS/FROZEN SHOULDER DISORDER:** Adhesive capsulitis of the shoulder, also known as frozen shoulder disorder, is a soft tissue lesion of the glenohumeral joint resulting in restrictions of passive and active range of motion. Occupational adhesive capsulitis arises secondarily to any chest or upper extremity trauma. It may also occur following stroke, traumatic brain injury or spinal cord injury among other etiologies. Primary adhesive capsulitis is rarely occupational in origin. The disorder goes through stages, specifically:

Stage 1: Consists of acute pain with some limitation in range of motion; generally lasting 2-9 months.

Stage 2: Characterized by progressive stiffness, loss of range of motion, and muscular atrophy; it may last an additional 4-12 months beyond Stage 1.

Stage 3: Characterized by partial or complete resolution of symptoms and restoration of range of motion and strength; it usually takes an additional 6-9 months beyond Stage 2.

a. History and Mechanism of Injury (Adhesive Capsulitis/Frozen Shoulder):

- i. Mechanism of Injury: There often is some history of prior injury. Often adhesive capsulitis is seen with impingement syndrome or other shoulder disorders; refer to appropriate subsection of this guideline.
- ii. Patient will usually complain of pain in the sub-deltoid region, but occasionally over the long head of the biceps or radiating down the lateral aspect of the arm to the forearm. Pain is

often worse at night with difficulty sleeping on the involved side. Motion is restricted and painful.

- b. **Physical Findings (Adhesive Capsulitis/Frozen Shoulder):**
Restricted active and passive glenohumeral range of motion is the primary physical finding. It may be useful for the examiner to inject the glenohumeral joint with lidocaine and then repeat range of motion to rule out other shoulder pathology; lack of range of motion confirms the diagnosis. Postural changes and secondary trigger points along with atrophy of the deltoid and supraspinatus muscles may be seen.
- c. **Laboratory Tests (Adhesive Capsulitis/Frozen Shoulder)** are not indicated unless systemic illness or disease is suspected.
- d. **Testing Procedures (Adhesive Capsulitis/Frozen Shoulder):**
 - i. Plain x-rays are generally not helpful except to rule out concomitant pathology.
 - ii. Arthrography may be helpful in ruling out other pathology when other pathology is suspected or establishing the identification and diagnosis of a contracted joint capsule. Arthrography can also be therapeutic as steroids and/or anesthetics may be injected and a brisement or distension arthrogram can be done at the same time (refer to the next subsection on non-operative treatment procedures for further discussion).
- e. **Non-operative Treatment Procedures (Adhesive Capsulitis/Frozen Shoulder)** address the goal to restore and maintain function and may include:
 - i. Physical medicine interventions are the mainstay of treatment and may include thermal treatment, ultrasound, TENS, manual therapy, and passive and active range-of-motion exercises; as the patient progresses, strengthening exercises should be included in the exercise regimen.
 - ii. Medications, such as NSAIDs and analgesics, may be helpful; narcotics are indicated only for post-manipulation or post-operative cases.

- iii. Occasionally, subacromial bursa and/or glenohumeral steroid injections can decrease inflammation and allow the therapist to progress functional exercise and range of motion. Subacromial space injection with steroids may be useful if the patient responded positively to a diagnostic injection of an anesthetic. Steroid injections directly into the tendons are not recommended.
 - Frequency: Not more than 2-3 times annually. Usually 1 or 2 injections adequate. A minimum of 3 weeks interval between injections is recommended.
 - Time to produce effect: Immediate with local anesthetic, or within 3 days with corticosteroids.
 - Maximum duration: Limited to 3 injections annually to the same site.
- iv. In cases that are refractory to conservative therapy lasting at least 3-6 months and where range of motion remains significantly restricted (abduction less than 90°), the following more aggressive treatment may be considered:
 - Distension arthrography or "brisement" in which saline, an anesthetic and usually a steroid are forcefully injected into the shoulder joint causing disruption of the capsule. Early and aggressive physical medicine to maintain range of motion and restore strength and function should follow distension arthrography or manipulation under anesthesia; return to work with restrictions should be expected within one week of the procedure; return to full duty is expected within 4-6 weeks.
- v. Manipulation: Manipulative treatment (not therapy) is defined as the therapeutic application of manually guided forces by a physician to improve physiologic function and support homeostasis that has been altered by the injury or occupational disease, and has associated clinical significance.
 - Time to produce effect for shoulder treatment: 1-6 treatments.

- Frequency: Up to 2-3 times a week for 8-12 weeks, as indicated by the severity of involvement and the desired effect, then up to 2 treatments per week for the next 4 weeks.
- Optimum duration: 8-12 weeks.
- Maximum duration: 3 months. Extended durations of care beyond what is considered “maximum” may be necessary in cases of intractable adhesions, or when resumed after intra-articular injection, arthrogram or manipulation under anesthesia (performed by a qualified surgeon).

f. **Operative Procedures (Adhesive Capsulitis/Frozen Shoulder):**

For cases failing conservative therapy of at least 3-6 months duration and which are significantly limited in range of motion (abduction less than 90°), the following operative procedure may be considered:

- i. Manipulation Under General Anesthesia (MUA) is indicated in cases of intractable restriction, and may be performed by a duly qualified surgeon. It may be done in combination with steroid injection or distension arthrography.

g. **Post-Operative Procedures (Adhesive Capsulitis/Frozen Shoulder)** would include an individualized rehabilitation program based upon communication among the physicians, the surgeon and the therapists.

- i. Early and aggressive physical medicine interventions are recommended to maintain range of motion and progress strengthening; return to work with restrictions after surgery should be discussed with the treating provider. The patient should be approaching MMI within 8-12 weeks post-operative; however, coexistence of other pathology should be taken into consideration.

3. **BICIPITAL TENDON DISORDERS** may include 1) primary bicipital tendonitis, which is exceedingly rare; 2) secondary bicipital tendinitis which is generally associated with rotator cuff tendinitis or impingement syndrome (refer to the appropriate diagnosis subsections); 3) subluxation of the biceps tendon which occurs with dysfunction of the transverse intertubercular ligament and massive rotator cuff tears; and 4) acute

disruption of the tendon, which can result from an acute distractive force or transection of the tendon from direct trauma. Evaluation of the elbow may be required when evaluating bicipital tendon injury.

a. History and Mechanism of Injury (Bicipital Tendon Disorders):

- i. Mechanism of Injury: Bicipital tendon disorders may include symptoms of pain and/or achiness that occur after repetitive use of the shoulder and/or blunt trauma to the shoulder. Secondary bicipital tendinitis may be associated with prolonged above-the-shoulder activities, and/or repeated shoulder flexion, external rotation and abduction. Acute trauma to the biceps tendon of the shoulder girdle may also give rise to injury of the biceps tendon.
- ii. Disorders of the biceps tendon may accompany scapulothoracic dyskinesia, rotator cuff injury, AC joint separation, subdeltoid bursitis, shoulder instability or other shoulder pathology. Symptoms may be exacerbated or provoked by work that activates the biceps muscle. Symptoms may be exacerbated by other activities that are not necessarily work-related.
- iii. Symptoms may include aching, burning and/or stabbing pain in the shoulder, usually involving the anterior medial portion of the shoulder girdle. The symptoms are exacerbated with above-the-shoulder activities and those specifically engaging the biceps (flexion at the shoulder, flexion at the elbow and supination of the forearm). Relief occurs with rest. Patients may report nocturnal symptoms which interfere with sleep during the acute stages of inflammation; pain and weakness in shoulder during activities; repeated snapping phenomenon with a subluxing tendon; immediate sharp pain and tenderness along the course of the long head of the biceps following a sudden trauma which would raise suspicions of acute disruption of the tendon; and/or with predominant pain at the shoulder referral patterns which may extend pain into the cervical or distal structures, including the arm, elbow, forearm and wrist.

- b. Physical Findings (Bicipital Tendon Disorders) may include:**
- i. If continuity of the tendon has been lost (biceps tendon rupture), inspection of the shoulder would reveal deformity (biceps bunching);
 - ii. Palpation demonstrates tenderness along the course of the bicipital tendon;
 - iii. Pain at end range of flexion and abduction as well as biceps tendon activation; and/or
 - iv. Provocative testing may include:
 - Yegerson's sign - pain with resisted supination of forearm;
 - Speed's Test - pain with resisted flexion of the shoulder (elbow extended and forearm supinated); or
 - Ludington's Test - pain with contraction of the biceps (hands are placed behind the head placing the shoulders in abduction and external rotation).
- c. Laboratory Tests (Bicipital Tendon Disorders) are not indicated unless a systemic illness or disease is suspected.**
- d. Testing Procedures (Bicipital Tendon Disorders):**
- i. Plain x-rays include:
 - Anterior/Posterior (AP) view visualizes elevation of the humeral head, indicative of absence of the rotator cuff due to a tear;
 - Lateral view in the plane of the scapula or an axillary view determines if there is anterior or posterior dislocation or the presence of a defect in the humeral head (a Hill-Sachs lesion);
 - 30° caudally angulated AP view determines if there is a spur on the anterior/inferior surface of the acromion and/or the far end of the clavicle; and

- Outlet view determines if there is a downwardly tipped acromion.
- ii. Adjunctive testing, such as sonography, MRI or arthrography, should be considered when shoulder pain is refractory to 4-6 weeks of nonoperative conservative treatment and the diagnosis is not readily identified by standard radiographic techniques.

e. **Non-operative Treatment Procedures (Bicipital Tendon Disorders):**

- i. Benefit may be achieved through procedures such as thermal therapy, immobilization, alteration of occupation and/or work station and manual therapy.
- ii. Medication, such as nonsteroidal anti-inflammatories and analgesics, would be indicated; narcotics are not normally indicated.
- iii. Physical medicine and rehabilitation interventions should emphasize a progressive increase in range of motion without exacerbation of the AC joint injury. With increasing motion and pain control, a strengthening program should be instituted and return to modified/limited duty would be considered at this time. By 8-11 weeks, with restoration of full motion, return to full duty should be anticipated.
- iv. Soft tissue injections (biceps tendon insertion) with steroids may be therapeutic if the patient responded positively to a diagnostic injection of an anesthetic. Steroid injections directly into the tendons are not recommended.
 - Frequency: Not more than 2-3 times annually. Usually 1 or 2 injections adequate. A minimum of 3 weeks interval between injections is recommended.
 - Time to produce effect: Immediate with local anesthetic, or within 3 days with corticosteroids.
 - Maximum duration: limited to 3 injections annually to the same site.

f. **Operative Procedures (Bicipital Tendon Disorders):**

- i. **Bicipital Tendinitis:** Conservative care prior to potential surgery must address flexibility and strength imbalances. Surgical remedies would be considered after 12 weeks of appropriate conservative care has failed. Since impingement of the biceps tendon could cause continued irritation, an acromioplasty may be necessary, especially when the presence of an obstructing osteophyte is demonstrated on plain x-rays.
- ii. **Subluxing Bicipital Tendon:** The decision to surgically stabilize the bicipital tendon is not commonly indicated. In the vast majority of cases, optimal outcome is achieved through successful rehabilitation procedures and appropriate conservative measures should be maximized prior to surgical intervention.
- iii. **Acute Disruption of the Bicipital Tendon:** Conservative care should be the mainstay of treatment with particular attention given to the patient's age, work description and motivation. Surgery is almost never considered in full thickness ruptures of the bicipital tendon.

g. **Post-Operative Procedures (Bicipital Tendon Disorders)** would include an individualized rehabilitation program based upon communication among the physicians, the surgeon and the therapists. Rehabilitation, lasting 6-12 weeks, is necessary to facilitate maximum medical improvement (MMI).

4. **BRACHIOPLEXUS INJURIES** to the nerves and shoulder girdle region result in loss of motor and sensory function, pain and instability of the shoulder. Signs and symptoms vary with the degree of mechanism of injury. The two modes of injury are: 1) acute direct trauma, and 2) repetitive motion or overuse. Transient compression, stretch or traction (neuropraxia) causes sensory and motor signs lasting days to weeks. Damage to the axon (axonemesis) without disruption of the nerve framework may cause similar symptoms. The recovery time is delayed and depends upon axon regrowth distally from the site of injury. Laceration or disruption of the entire nerve with complete loss of framework (neuromesis) is the most severe form of nerve injury. Return of function is dependent upon regrowth of the nerve distal to the injury site.

Electrodiagnostic studies are the most commonly used diagnostic modality to analyze nerve injuries. These studies should be utilized when necessary as an extension of the history and clinical examination.

Slowing of motor nerve conduction velocities due to demyelination localizes regions of entrapment and injury. Denervation demonstrated on the electromyographic portion is indicative of motor axonal or anterior horn cell loss. Studies should be performed 3-4 weeks following injury or description of symptoms. If the symptoms have been present for longer than 3-4 weeks, studies may be performed immediately after the initial evaluation. Serial studies may be indicated if initial studies are negative and may also be useful for gauging prognosis. Limb temperature influences nerve conduction velocities. In cases when significant slowed conduction is recorded, the standard of the American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM) including temperatures should be followed.

There are six relatively common nerve injuries to the shoulder girdle. Each type will be addressed separately.

- I. **Brachial Plexus** is formed by the nerve roots of C5-C8 and T1; these nerve roots exit the cervical spine and pass through the scalene musculature; after leaving the scalene musculature, at the level of the clavicle, they form trunks, divisions and chords which ultimately form the peripheral nerves of the arm.
 - a. **History and Mechanism of Injury (Brachial Plexus):**
 - i. Mechanism of Injury: direct injury to brachial plexus results in widespread sensory and motor loss. Direct trauma, subluxation to shoulder, clavicular fractures, shoulder depression, head deviation away from the arm may result in variable brachial plexus lesions. It is important to differentiate injuries to the brachial plexus from the acquired (non-work-related) syndrome of brachial plexus neuritis, Parsonage-Turner Syndrome.
 - b. **Physical Findings (Brachial Plexus) may include:**
 - i. Inspection for evidence of trauma or deformity;

- ii. Identification of sensory loss and demonstration of weakness which relates to the severity and anatomy of the injury to the brachial plexus; and/or
 - iii. Pain with recreation of the motions during the mechanism of injury.
- c. **Laboratory Tests (Brachial Plexus)** are not indicated unless a systemic illness or disease is suspected.
- d. **Testing Procedures (Brachial Plexus)** may include electrodiagnostic studies. If they do not localize and give sufficient information, then additional information may be obtained from MRI and/or myelography. These studies are employed to differentiate root avulsion from severe brachial plexus injuries. Evaluation of brachial plexus may include an apical lordotic chest x-ray.
- e. **Non-operative Treatment Procedures (Brachial Plexus):**
 - i. In closed injuries, observation is favored; repeat electrodiagnostic studies may be helpful to follow recovery.
 - ii. Rehabilitation utilizing procedures set forth in Section D, Non-operative Treatment Procedures.
 - iii. Medications, such as analgesics, nonsteroidal anti-inflammatories, antidepressants and anticonvulsants may be indicated; steroids may be prescribed to help diminish the inflammatory response. Narcotics may be indicated acutely and should be prescribed as indicated for limited periods.
- f. **Operative Procedures (Brachial Plexus):** For open injuries, exploration may be worthwhile if there is poor progression of recovery from a conservative approach; for closed injuries, if progressive weakness and loss of function is documented after 4-6 months of conservative care, then exploration is also warranted.
- g. **Post-Operative Procedures (Brachial Plexus)** would include an individualized rehabilitation program based upon communication among the physicians, surgeon and

therapist. This program would begin with 4-6 weeks of rest followed by progressive increase in motion and strength.

II. **Axillary Nerve** is derived from the 5th and 6th cervical roots. It passes around the shoulder and supplies motor branches to the teres minor and the three heads of the deltoid; it gives sensation to the lateral aspect of the proximal arm at the level of the deltoid.

a. **History and Mechanism of Injury (Axillary Nerve):**

Mechanism of Injury: direct injury and penetrating wounds to the shoulder and upward pressure on the axilla can cause injury to the axillary nerve; abnormalities of the nerve can also be seen with fractures of the surgical neck of the humerus and dislocation of the shoulder. Finally, axillary nerve injury can be seen with shoulder surgery in and of itself.

b. **Physical Findings (Axillary Nerve) may include:**

- i. Weakness and atrophy of the deltoid muscle;
- ii. Strength is lost in abduction, flexion and extension of the shoulder; and/or
- iii. Sensory loss can be seen over the upper arm.

c. **Laboratory Tests (Axillary Nerve)** are not indicated unless a systemic illness or disease is suspected.

d. **Testing Procedures (Axillary Nerve)** may include electrodiagnostic studies for patients with persistent symptoms.

e. **Nonoperative Treatment Procedures (Axillary Nerve):**

- i. Rehabilitation utilizing procedures set forth in Section D, Non-operative Treatment Procedures.
- ii. Medications such as analgesics, nonsteroidal anti-inflammatories, antidepressants and anticonvulsants may be indicated and narcotics may on rare occasions be indicated acutely.

- f. **Operative Procedures (Axillary Nerve)** are usually not necessary, since most injuries to the axillary nerve are due to stretch and/or traction. One may consider surgery after 4-6 months with electrodiagnostic studies documenting ongoing denervation and loss of function.
- g. **Post-Operative Procedures (Axillary Nerve)** would include an individualized rehabilitation program based upon communication among the physicians, the surgeon and the therapists. This program would begin with 4-6 weeks of rest followed by progressive increase in motion and strength.

III. **Long Thoracic Nerve** is formed by the cervical fifth, sixth, and seventh roots; it crosses the border of the first rib and descends along the posterior surface of the thoracic wall to the serratus anterior.

- a. **History and Mechanism of Injury (Long Thoracic Nerve):**
 - i. Mechanism of Injury: injury can occur by direct trauma to the posterior triangle of the neck or trauma may be the result of chronically repeated or forceful shoulder depression. Repeated forward motion of the arms as well as stretch or compression of the nerve with the arms abducted can lead to long thoracic nerve dysfunction.
- b. **Physical Findings (Long Thoracic Nerve) may include:**
 - i. Dull ache in the region of the shoulder without sensory loss;
 - ii. Scapular deformity and/or winging may be described by patient or family; and/or
 - iii. Serratus Anterior (scapular winging) may be demonstrated by asking the patient to flex and lean on the patient's arms, such as against a wall and/or the examiner resisting protraction.
- c. **Laboratory Tests (Long Thoracic Nerve)** are not indicated unless a systemic illness or disease is suspected.

- d. **Testing Procedures (Long Thoracic Nerve):** When signs or symptoms persist, electrodiagnostic studies are used to define the anatomy and severity of the injury; side-to-side comparisons of the nerve can be helpful to confirm the diagnosis. Studies may also exclude more widespread brachial plexus involvement.
- e. **Non-operative Treatment (Long Thoracic Nerve):**
 - i. Rehabilitation utilizing procedures set forth in Section D, Non-operative Treatment Procedures.
 - ii. Medications, such as analgesics, nonsteroidal anti-inflammatories, antidepressants and anticonvulsants may be indicated, and narcotics, on rare occasions, may be indicated acutely.
- f. **Operative Procedures (Long Thoracic Nerve)** such as scapular fixation may be recommended, but only in the most severe cases where there is documented significant loss of function.
- g. **Post-Operative Procedures (Long Thoracic Nerve)** should include an individualized rehabilitation program based upon communication among the physicians, the surgeon and the therapists. This program would begin with 8-10 weeks of rest followed by progressive increase in motion and strength.

IV. **Musculocutaneous Nerve** is derived from the fifth and sixth cervical roots; it innervates the coracobrachialis, biceps and brachialis muscles and also provides sensation to the lateral aspect of the forearm. Trauma (including surgery) or penetrating wound to the brachial plexus, coracobrachialis, and shoulder often can cause nerve injury.

- a. **History and Mechanism of Injury (Musculocutaneous Nerve):**
 - i. Mechanism of Injury: most commonly a stretch/traction injury due to forceful extension of the elbow inducing nerve dysfunction; trauma can be seen to the sensory component (lateral antebrachial

cutaneous nerve) which delineates loss of sensation to the forearm.

- b. **Physical Findings (Musculocutaneous Nerve) may include:**
 - i. Pain in the arm;
 - ii. Weakness and atrophy in the biceps and brachialis; and/or
 - iii. Sensory loss over the lateral aspect of the forearm; however, is not always seen.
- c. **Laboratory Tests (Musculocutaneous Nerve)** are not indicated unless a systemic illness or disease is suspected.
- d. **Testing Procedures (Musculocutaneous Nerve)** include electrodiagnostic studies when signs or symptoms persist; side-to-side comparisons of the motor and sensory components of the nerve may be useful since standard norms are not always reliable.
- e. **Non-operative Treatment Procedures (Musculocutaneous Nerve):**
 - i. Rehabilitation utilizing procedures set forth in Section D, Non-operative Treatment Procedures.
 - ii. Medications, such as analgesics, nonsteroidal anti-inflammatories, antidepressants and anticonvulsants, may be indicated. Narcotics, on rare occasions, may be indicated.
- f. **Operative Procedures (Musculocutaneous Nerve)** are usually not necessary unless there has been increasing loss of function over 4-6 months and/or a laceration to the nerve has been identified.
- g. **Post-Operative Procedures (Musculocutaneous Nerve)** would include an individualized rehabilitation program based upon communication among the physicians, the surgeon and the therapists. This program would begin with 8-10 weeks of rest followed by progressive increase in motion and strength.

- V. **Spinal Accessory Nerve** is the eleventh cranial nerve; the nerve innervates the ipsilateral sternocleidomastoid and trapezius muscles which are extremely important for scapular control and ultimately shoulder function.
- a. **History and Mechanism of Injury (Spinal Accessory Nerve):**
- i. Mechanism of Injury: direct trauma to the posterior neck, forceful compression of the shoulder downward and/or deviation of the head away from the traumatized shoulder can lead to injury to this nerve; surgical resection of the posterior neck can disrupt the nerve.
- b. **Physical Findings (Spinal Accessory Nerve) may include:**
- i. Pain in the shoulder;
 - ii. Weakness or paralysis of the trapezius which is seen as winging with the arms out to the side (abduction); and/or
 - iii. Drooping of the shoulder.
- c. **Laboratory Tests (Spinal Accessory Nerve)** are not indicated unless a systemic illness or disease is suspected.
- d. **Testing Procedures (Spinal Accessory Nerve)** include electrodiagnostic studies when signs and symptoms persist. Electrodiagnostic studies are used to define the anatomy and severity of the injury; side-to-side comparisons of the nerve can be helpful to confirm the diagnosis; radiographic procedures may be necessary to exclude lesion at the base of the brain or upper cervical spine.
- e. **Non-operative Treatment Procedures (Spinal Accessory Nerve):**
- i. Rehabilitation utilizing procedures set forth in Section D, Non-operative Treatment Procedures.
 - ii. Medications, such as analgesics, nonsteroidal anti-inflammatories, antidepressants and anticonvulsants,

may be indicated and narcotics, on rare occasions, may be indicated acutely.

- f. **Operative Procedures (Spinal Accessory Nerve)** are usually not necessary unless increased loss of function over 4-6 months has been documented and/or a laceration to the nerve has been identified.
- g. **Post-Operative Procedures (Spinal Accessory Nerve)** would include an individualized rehabilitation program based upon communication among the physicians, the surgeon and the therapists. This program would begin with 8-10 weeks of rest followed by progressive increase in motion and strength.

VI. **Suprascapular Nerve** is derived from the fifth and sixth cervical root, superior trunk of the brachial plexus, and it innervates the supraspinatus and infraspinatus muscles of the rotator cuff.

- a. **History and Mechanism of Injury (Suprascapular Nerve):**
 - i. Mechanism of Injury: supraclavicular trauma, stretch, and friction through the suprascapular notch or against the transverse ligament at the notch can cause injury to the nerve; repetitive use of the arm has been shown on occasion to cause traction to the nerve.
- b. **Physical Findings (Suprascapular Nerve) may include:**
 - i. Pain at the shoulder;
 - ii. Wasting at the supraspinatus and/or infraspinatus muscles with weakness; and/or
 - iii. Tinel's can help to elicit a provocative pain response.
- c. **Laboratory Tests (Suprascapular Nerve)** are not indicated unless a systemic illness or disease is suspected.
- d. **Testing Procedures (Suprascapular Nerve)** include electrodiagnostic studies when signs and symptoms persist. Side-to-side comparisons may be useful since standard norms are not always reliable. If one suspects a mass lesion at the suprascapular notch, then an MRI may be indicated.

- e. **Non-operative Treatment Procedures (Suprascapular Nerve):**
 - i. Rehabilitation utilizing procedures set forth in Section D, Non-operative Treatment Procedures.
 - ii. Medications, such as analgesics, nonsteroidal anti-inflammatories, antidepressants and anticonvulsants, may be indicated and narcotics, on rare occasions, may be indicated acutely.
 - f. **Operative Treatment Procedures (Suprascapular Nerve)** involving surgical release at the suprascapular notch or spinoglenoid region is warranted depending upon the results of the electrodiagnostic studies and/or absence of improvement with conservative management.
 - g. **Post-Operative Procedures (Suprascapular Nerve)** would include an individualized rehabilitation program based upon communication among the physicians, the surgeon and the therapists. This program would begin with 8-10 weeks of rest followed by progressive increase in motion and strength.
5. **BURSITIS OF THE SHOULDER:** Acute or chronic inflammation of the bursa (a potential fluid filled sac) that may be caused by trauma, chronic overuse, inflammatory arthritis, and acute or chronic infection that generally presents with localized pain and tenderness of the shoulder.
- a. **History and Mechanism of Injury (Bursitis of the Shoulder):**
 - i. Mechanism of Injury: onset of symptoms, date, mechanism of onset, and occupational history and current requirements should be correlated with the intensity, character, duration and frequency of associated pain and discomfort.
 - ii. History may include nocturnal pain, pain with over-the-shoulder activities, feeling of shoulder weakness, prior treatment for presenting complaint(s), specific limitations of movement and pertinent familial history.

- b. **Physical Findings (Bursitis of the Shoulder) may include:**
- i. Palpation elicits localized tenderness over the particular bursa or inflamed tendon; loss of motion during activity;
 - ii. Painful arc may be seen between 40-120°; and/or
 - iii. Bursitis may be associated with other shoulder injury diagnoses such as impingement, rotator cuff instability, tendinitis, etc.; refer to applicable diagnosis subsections for additional guidelines.
- c. **Laboratory Tests (Bursitis of the Shoulder)** may be used to rule out systemic illness or disease when proper clinical presentation indicates the necessity for such testing. On rare occasions, when indicated, testing could include sedimentation rate, rheumatoid profile, complete blood count (CBC) with differential and serum uric acid level. Routine screening of other medical disorders may be necessary, as well as bursal aspiration with fluid analysis.
- d. **Testing Procedures (Bursitis of the Shoulder):**
- i. Plain x-rays include:
 - AP view visualizes elevation of the humeral head, indicative of chronic absence of the rotator cuff due to a tear;
 - Lateral view in the plane of the scapula or an axillary view determines if there is anterior or posterior dislocation or the presence of a defect in the humeral head (a Hill-Sachs lesion);
 - 30° caudally angulated AP view determines if there is a spur on the anterior/ interior surface of the acromion and/or the far end of the clavicle; and
 - Outlet view determines if there is a downwardly tipped acromion.

e. **Non-operative Treatment Procedures (Bursitis of the Shoulder):**

- i. Benefits may be achieved through non-operative treatment procedures, such as immobilization, therapeutic exercise, alteration of occupation and work station, thermal therapy, and ultrasound. Exclusive use of passive modalities should be limited to the first 2-3 weeks during the acute phase of shoulder discomfort, and accompanied by active therapies as soon as these are appropriate.
- ii. May return to work without overhead activities and lifting with involved arm until cleared by physician for those and heavier activities.
- iii. Additional modalities/treatment procedures may include physical medicine and rehabilitation including instruction in therapeutic exercise, proper work technique and manual therapy; vocational rehabilitation, vocational assessment and interdisciplinary team approach. Biofeedback is not recommended.
- iv. Medications such as nonsteroidal anti-inflammatories and analgesics may be considered.
- v. Subacromial space injection with steroids may be therapeutic if the patient responded positively to a diagnostic injection of an anesthetic. Steroid injections directly into the tendons are not recommended.
 - Frequency: Not more than 2-3 times annually. Usually 1 or 2 injections adequate. A minimum of 3 weeks interval between injections is recommended.
 - Time to produce effect: Immediate with local anesthetic, or within 3 days with corticosteroids.
 - Maximum duration: Limited to 3 injections annually to the same site.

f. **Operative Procedures (Bursitis of the Shoulder)** are not commonly indicated for pure bursitis.

6. **IMPINGEMENT SYNDROME:** A collection of symptoms, not a pathologic diagnosis. The symptoms result from the encroachment of the acromion, coracoacromial ligament, coracoid process, and/or the AC joint on the rotator cuff mechanism that passes beneath them as the shoulder is moved. The cuff mechanism is intimately related to the coracoacromial arch. Separated only by the thin lubricating surfaces of the bursa, compression and friction can be minimized by several factors, such as
- Shape of the coracoacromial arch that allows passage of the subjacent rotator cuff;
 - Normal undersurface of the AC joint;
 - Normal bursa;
 - Normal capsular laxity; and
 - Coordinated scapulothoracic function.

The impingement syndrome may be associated with AC joint arthritis and both partial- and full-thickness rotator cuff tears, as well as adhesive capsulitis/frozen shoulder. Normal function of the rotator cuff mechanism and biceps tendon assist to diminish impingement syndrome.

a. **History and Mechanism of Injury (Impingement Syndrome):**

- i. Mechanism of Injury: established repetitive overuse of the upper extremity; many times this is seen with constant overhead motion.
- ii. History may include:
 - Delayed presentation: Since the syndrome is usually not an acute problem, patients will access care if their symptoms have not resolved with rest, time and "trying to work it out";
 - Complaints of functional losses due to pain, stiffness, weakness and catching when the arm is flexed and internally rotated; and
 - Poor sleep is common and pain is often felt down the lateral aspect of the upper arm near the deltoid insertion or over the anterior proximal humerus.

b. Physical Findings (Impingement Syndrome) may include:

- i. Inspection of the shoulder may reveal deltoid and rotator cuff atrophy;
- ii. Range of motion is limited, particularly in internal rotation and in cross-body adduction;
- iii. Passive motion through the 60-90° arc of flexion may be accompanied by pain and crepitus; this is accentuated as the shoulder is moved in and out of internal rotation;
- iv. Active elevation of the shoulder is usually more uncomfortable than passive elevation;
- v. Pain on maximum active forward flexion is frequently seen with impingement syndrome, but is not specific for diagnosis;
- vi. Strength testing may reveal weakness. This weakness may be the result of pain, disuse, tendon damage, or poor scapulothoracic mechanics;
- vii. Pain on resisted abduction or external rotation may also indicate that the integrity of the rotator cuff tendons may be compromised; and/or
- viii. Weakness of the posterior scapular stabilizers can also be seen as a contributing factor to impingement syndrome by altering the mechanics of the glenohumeral joint.

c. Laboratory Tests (Impingement Syndrome) are not indicated unless a systemic illness or disease is suspected.

d. Testing Procedures (Impingement Syndrome):

- i. Plain x-rays include:
 - AP view visualizes elevation of the humeral head, indicative of rotator cuff fiber failure with diminished space at the subacromial area;
 - Lateral view in the plane of the scapula or an axillary view can help to determine aspects of instability which can give symptoms similar to impingement syndrome;

- 30° caudally angulated AP view can assess for a spur on the anterior/inferior surface of the acromion and/or the distal end of the clavicle which can lead to encroachment on the rotator cuff mechanism with motion; and
 - Outlet view determines if there is a downwardly tipped acromion.
- ii. Adjunctive testing, such as standard radiographic techniques (sonography, arthrography or MRI), should be considered when shoulder pain is refractory to 4-6 weeks of non-operative conservative treatment and the diagnosis is not readily identified by a good history and clinical examination.

e. **Non-operative Treatment Procedures (Impingement Syndrome)** may include:

- i. Medications, such as nonsteroidal anti-inflammatories and analgesics.
- ii. Subacromial space injection with steroids may be therapeutic if the patient responded positively to a diagnostic injection of an anesthetic. Steroid injections directly into the tendons are not recommended.
- Frequency: Not more than 2-3 times annually. Usually 1 or 2 injections adequate. A minimum of 3 weeks interval between injections is recommended.
 - Time to produce effect: Immediate with local anesthetic, or within 3 days with corticosteroids.
 - Maximum duration: Limited to 3 injections annually to the same site.
- iii. In order to have the most favorable outcome from a conservative approach, an aggressive attempt should be made to define the contributing factors which are driving the syndrome, such as shoulder stiffness, humeral head depressor weakness (rotator cuff fiber failure), and subacromial crowding AC joint arthritis.

- iv. Non-operative Treatment Procedures, such as relative rest, immobilization, thermal treatment, ultrasound, therapeutic exercise and physical medicine and rehabilitation should be considered.

- f. **Operative Procedures (Impingement Syndrome):** Operative procedures for impingement syndrome should not be considered prior to an adequate trial of physical rehabilitation that includes direction and supervision by an appropriate, licensed professional and active patient participation. Such a trial should normally last for a minimum of 6 weeks. Refer to Table 2: Criteria for Shoulder Surgery - Impingement Syndrome.

Table 2: Criteria for Shoulder Surgery – Impingement Syndrome

If the patient has	AND the diagnosis is supported by			AND this has been done (if recommended)	The following surgery may be appropriate
DIAGNOSIS	CLINICAL FINDINGS			CONSERVATIVE CARE	SURGICAL PROCEDURE
	SUBJECTIVE	OBJECTIVE	IMAGING		
<p>Acromial Impingement Syndrome</p> <p>(80% of these patients will get better without surgery)</p>	<p>Pain with active arc motion 90 - 130°</p> <p>AND</p> <p>Pain at night;</p> <p>Tenderness over the greater tuberosity is common in acute cases.</p>	<p>Weak or absent abduction. May also demonstrate atrophy</p> <p>AND</p> <p>Tenderness over rotator cuff or anterior acromial area</p> <p>AND</p> <p>Positive impingement sign and temporary relief of pain with anesthetic injection (diagnostic injection test).</p>	<p>Conventional x-rays, AP, and true lateral or axillary view</p> <p>AND</p> <p>MRI, Ultra-sound or Arthro-gram shows positive evidence of deficit in rotator cuff.</p>	<p>Recommend 3-6 months: three months is adequate if treatment has been continuous, six months if treatment has been intermittent.</p> <p>Treatment must be directed toward gaining full range of motion, which requires both stretching and strengthening to balance the musculature.</p>	<p>Anterior Acromioplasty</p>

g. Post-Operative Procedures (Impingement Syndrome):

- i. Individualized rehabilitation programs based upon communication among the physicians, the surgeon and the therapists might include:
 - Sling or abduction splint;
 - Gentle pendulum exercise, passive glenohumeral range of motion and aggressive posterior scapular stabilizing training can be instituted;
 - At 4 weeks post-operative, begin isometrics and ADL involvement; and/or
 - Depending upon the patient's functional response, at 6 weeks post-operative consider beginning light resistive exercise; concomitantly, return to a light/modified duty may be plausible given the ability to accommodate "no repetitive overhead activities."
- ii. Progressive resistive exercise from 2 months with gradual returning to full activity at 5-7 months; all active non-operative procedures listed in Section D, Non-operative Treatment Procedures, should be considered.
- iii. Work restrictions should be evaluated every 4-6 weeks during post-operative recovery and rehabilitation with appropriate written communications to both the patient and the employer. Should progress plateau, the provider should reevaluate the patient's condition and make appropriate adjustments to the treatment plan.

- 7. ROTATOR CUFF TEARS:** Partial or full-thickness tears of the rotator cuff tendons, most often the supraspinatus, can be caused by vascular, traumatic or degenerative factors or a combination. Further tear classification includes: a small tear is less than 1 cm; medium tear is 1-3 cm; large tear is 3-5 cm; and massive tear is greater than 5 cm, usually with retraction.

a. **History and Mechanism of Injury (Rotator Cuff Tear):**

- i. Mechanism of Injury: established with sudden trauma to the shoulder or chronic over-use with repetitive overhead motion with internal or external rotation.
- ii. History may include:
 - Partial-thickness cuff tears usually occur in age groups older than 30. Full-thickness tears can occur in younger age groups.
 - Complaints of pain along anterior, lateral or posterior glenohumeral joint.

b. **Physical Findings (Rotator Cuff Tear) may include:**

- i. Partial-Thickness Tears
 - There will be pain at the end of range of motion with full passive range of motion for abduction, elevation, external rotation; internal rotation is attainable;
 - Active range of motion will be limited and painful for abduction and external rotation, as well as internal rotation and forward flexion;
 - A painful arc may be present with active elevation;
 - Pain will be positive for resisted tests (abduction, flexion, external rotation, internal rotation, abduction/internal rotation at 90°, and abduction/external rotation at 45°; and/or
 - If there are positive impingement signs, refer to Section 6, Impingement Syndrome.
- ii. Full-Thickness Tears
 - Passive and resisted findings are similar to those for partial-thickness tears; and/or
 - Active elevation will be severely limited with substitution of scapular rotation being evident.

- c. **Laboratory Tests (Rotator Cuff Tear)** are not indicated unless a systemic illness or disease is suspected.
- d. **Testing Procedures (Rotator Cuff Tear):**
- i. Plain x-rays include:
 - AP view visualizes elevation of the humeral head, indicative of absence of the rotator cuff due to a tear;
 - Lateral view in the plane of the scapula or an axillary view determines if there is anterior or posterior dislocation or the presence of a defect in the humeral head (a Hill-Sachs lesion);
 - 30° caudally angulated AP view determines if there is a spur on the anterior/inferior surface of the acromion and/or the far end of the clavicle; and
 - Outlet view determines if there is a downwardly tipped acromion.
 - ii. Adjunctive testing should be considered when shoulder pain is refractory to 4-6 weeks of non-operative conservative treatment and the diagnosis is not readily identified by standard radiographic techniques, then sonography, arthrography or MRI may be indicated. MRI should be performed sooner (e.g., 1-2 weeks), when there is clinical suspicion of full-thickness rotator cuff tear.
- e. **Non-operative Treatment Procedures (Rotator Cuff Tear):**
- i. Medications, such as nonsteroidal anti-inflammatories and analgesics, would be indicated; acute rotator cuff tear could indicate the need for limited narcotics use.
 - ii. Relative rest and non-operative treatment procedures, such as immobilization, therapeutic exercise, alteration of occupation/work station, thermal treatment, and therapeutic ultrasound. Exclusive use of passive modalities should be limited to the first 2-3 weeks during the acute phase of shoulder discomfort, and accompanied by active therapies as soon as these are appropriate. If no clinically significant increase in function for a partial- or full-thickness tear is

observed after adequate participation in a rehabilitation program, a surgical consultation is indicated. Adequate is here defined as at least 75% attendance in an active physical therapy program with a minimum of 2-3 sessions per week for 4 weeks. A physical therapy program that is based solely on passive modalities, or for which the claimant has not demonstrated compliance is insufficient. Early surgical intervention produces better surgical outcome due to healthier tissues and often less limitation of movement prior to and after surgery.

- f. **Operative Procedures (Rotator Cuff Tear):** Refer to Table 3, Criteria for Shoulder Surgery – Rotator Cuff Tear.

Table 3: Criteria for Shoulder Surgery – Rotator Cuff Tear

If the patient has	AND the diagnosis is supported by			AND this has been done (if recommended)	The following surgery may be appropriate
DIAGNOSIS	CLINICAL FINDINGS			CONSERVATIVE CARE	SURGICAL PROCEDURE
	SUBJECTIVE	OBJECTIVE	IMAGING		
<p>Full Thickness Rotator Cuff Tear</p> <p>AND</p> <p>Cervical pathology and frozen shoulder syndrome have been ruled out.</p>	<p>Shoulder pain and inability to elevate the arm;</p> <p>Tenderness over the greater tuberosity is common in acute cases.</p>	<p>Patient may have weakness with abduction testing;</p> <p>May also demonstrate atrophy of shoulder musculature;</p> <p>Usually has full passive range of motion.</p>	<p>Conventional x-rays, AP, and true lateral or axillary view</p> <p>AND</p> <p>MRI, Ultrasound, or Arthrogram shows positive evidence of deficit in rotator cuff.</p>	<p>Not required.</p>	<p>Rotator Cuff Repair.</p>
<p>Partial Thickness Rotator Cuff Tear.</p>	<p>Pain with active arc motion 90 - 130°</p> <p>AND</p> <p>Pain at night;</p> <p>Tenderness over the greater tuberosity is common in acute cases.</p>	<p>Weak or absent abduction. May also demonstrate atrophy</p> <p>AND</p> <p>Tenderness over rotator cuff or anterior acromial area</p> <p>AND</p> <p>Positive impingement sign and temporary relief of pain with anesthetic injection (diagnostic injection test).</p>	<p>Conventional x-rays, AP, and true lateral or axillary view</p> <p>AND</p> <p>MRI, Ultrasound, or Arthrogram shows positive evidence of deficit in rotator cuff.</p>	<p>Recommend 3-6 months; three months is adequate if treatment has been continuous, six months if treatment has been intermittent.</p> <p>Treatment must be directed toward gaining full range of motion, which requires both stretching and strengthening to balance the musculature.</p>	<p>Rotator Cuff Repair</p> <p>OR</p> <p>Anterior Acromioplasty.</p>

g. Post-Operative Procedures (Rotator Cuff Tear):

- i. Individualized rehabilitation program based on communication among the physicians, the surgeon and therapists might include:
 - Sling or abduction splint;
 - Gentle pendulum exercise, passive glenohumeral range of motion in flexion and external rotation to prevent adhesions and maintain mobilization;
 - At 6 weeks post-operative begin isometrics and ADL involvement;
 - Active assisted range of motion in supine with progression to sitting;
 - At 6-8 weeks, depending on quality of tissue, begin light resistive exercise;
 - Manual resistive exercise to 90°, scapular mobilization exercise with glenohumeral stabilization; and
 - Scapular plane exercise.
 - Pool exercise is not recommended.
- ii. Progressive resistive exercise from 3-6 months, with gradual returning to full activity at 6-9 months. All active non-operative procedures listed in Section D, Non-operative Treatment Procedures, should be considered.
- iii. Work restrictions should be evaluated every 4-6 weeks during post-operative recovery and rehabilitation with appropriate written communications to both the patient and employer. Should progress plateau, the provider should reevaluate the patient's condition and make appropriate adjustments to the treatment plan.

8. **ROTATOR CUFF TENDINITIS:** Inflammation of one or more of the four musculotendinous structures which arise from the scapula and insert on the lesser or greater tuberosity of the humerus. These structures include one internal rotator (subscapularis), and two external rotators (infraspinatus and teres minor), and the supraspinatus which assists in abduction.
- a. **History and Mechanism of Injury (Rotator Cuff Tendinitis):**
- i. Mechanism of Injury: established with sudden trauma to the shoulder or chronic over-use with repetitive overhead motion with internal or external rotation.
- b. **Physical Findings (Rotator Cuff Tendinitis) may include:**
- i. Pain with palpation to the shoulder with active or passive abduction and external rotation of the shoulder (painful arc);
 - ii. Pain with impingement signs; and/or
 - iii. Pain with specific activation of the involved muscles.
- c. **Laboratory Tests (Rotator Cuff Tendinitis)** are not indicated unless a systemic illness or disease is suspected.
- d. **Testing Procedures (Rotator Cuff Tendinitis) may include:**
- i. Plain x-ray films including AP lateral, axial, 30° caudally angulated AP, outlet view;
 - ii. If shoulder pain is refractory to 4-6 weeks of non-operative care and the diagnosis is not readily identified by standard radiographic techniques, then adjunctive testing, such as MRI, sonography or arthrography, may be indicated to rule out a rotator cuff tear;
 - iii. Subacromial space injection can be used as a diagnostic procedure by injecting an anesthetic, such as sensorcaine or xylocaine solutions, into the space. If the pain is alleviated with the injection, the diagnosis is confirmed.

e. **Non-operative Treatment Procedures (Rotator Cuff Tendinitis) may include:**

- i. Medications, such as nonsteroidal anti-inflammatories and analgesics;
- ii. Subacromial space injection with steroids may be therapeutic if the patient responded positively to a diagnostic injection of an anesthetic. Steroid injections directly into the tendons are not recommended.
 - Frequency: Not more than 2-3 times annually. Usually 1 or 2 injections adequate. A minimum of 3 weeks interval between injections is recommended.
 - Time to produce effect: Immediate with local anesthetic, or within 3 days with corticosteroids.
 - Maximum duration: limited to 3 injections annually to the same site;
- iii. Non-operative treatment procedures/modalities such as relative rest, immobilization, thermal treatment, ultrasound, therapeutic exercise, physical medicine and rehabilitation should be limited to the first 2-3 weeks during the acute phase of shoulder discomfort, and accompanied by active therapies as soon as these are appropriate.

f. **Operative Procedures (Rotator Cuff Tendinitis)** are not indicated for this diagnosis.

9. **SHOULDER FRACTURES:** There are five common types of shoulder fractures. Each type will be addressed separately and in the order of most frequent occurrence.

I. **Clavicular Fracture:**

a. **History and Initial Diagnostic Procedures (Clavicular Fracture):**

- i. Mechanism of Injury: can result from direct blows or axial loads applied to the upper limb; commonly associated injuries include rib fractures, long-bone

fractures of the ipsilateral limb and scapulothoracic dislocations.

b. Physical Findings (Clavicular Fracture) may include:

- i. Pain in the clavicle;
- ii. Abrasions on the chest wall, clavicle and shoulder can be seen;
- iii. Deformities can be seen in the above regions; and/or
- iv. Pain with palpation and motion at the shoulder joint area.

c. Laboratory Tests (Clavicular Fracture) are not indicated unless a systemic illness or disease is suspected.

d. Testing Procedures (Clavicular Fracture) would usually include routine chest x-rays. If they do not reveal sufficient information, then a 20° caudocranial AP view centered over both clavicles can be done.

e. Non-operative Treatment Procedures (Clavicular Fracture):

- i. Most are adequately managed by closed techniques and do not require surgery. After reduction, the arm is immobilized in a sling or figure-8 bandage. Shoulder rehabilitation is begun with pendulum exercises 10-14 days after injury. Subsequently, with pain control, the therapy program can be progressed with non-operative therapeutic approaches.
- ii. Medication, such as analgesics and nonsteroidal anti-inflammatories, would be indicated; narcotics, on rare occasions, may be indicated acutely for fracture.

f. Operative Procedures (Clavicular Fracture) would be indicated for open fractures, vascular or neural injuries requiring repair, bilateral fractures, ipsilateral scapular or glenoid neck fractures, scapulothoracic dislocations, flail chest and nonunion displaced-closed fractures that show no evidence of union after 4-6 months. Also a Type II fracture/dislocation at the AC joint where the distal clavicular

fragment remains with the acromion and the coracoid, and the large proximal fragment is displaced upwards.

- g. Post-Operative Procedures (Clavicular Fracture)** would include an individualized rehabilitation program based upon communication among the physicians, the surgeon and the therapists. This program would begin with 2-3 weeks of rest with a shoulder immobilizer while encouraging isometric deltoid strengthening; pendulum exercises with progression to assisted forward flexion and external rotation would follow; strengthening exercises should be started at 10-12 weeks.

II. Proximal Humeral Fracture:

- a. History Mechanism of Injury (Proximal Humeral Fracture):**
 - i. Mechanism of Injury: may be caused by a fall onto an abducted arm; may also be caused by high-energy (velocity or crush) trauma with an abducted or non-abducted arm; associated injuries are common, such as glenohumeral dislocation, stretch injuries to the axillary, musculocutaneous, and radial nerves; axillary artery injuries with high energy accident.
- b. Physical Findings (Proximal Humeral Fracture) may include:**
 - i. Pain in the upper arm;
 - ii. Swelling and bruising in the upper arm, shoulder and chest wall;
 - iii. Abrasions about the shoulder; and/or
 - iv. Pain with any attempted passive or active shoulder motion.
- c. Laboratory Tests (Proximal Humeral Fracture)** are not indicated unless a systemic illness or disease is suspected.
- d. Testing Procedures (Proximal Humeral Fracture):**
 - i. X-ray trauma series (3 views) are needed; AP view, axillary view and a lateral view in the plane of the

scapula. The latter two views are needed to determine if there is a glenohumeral dislocation.

- ii. Vascular studies are obtained emergently if the radial and brachial pulses are absent.
- iii. Classification is by the Neer Method: there can be four fragments – the humeral shaft, humeral head, greater tuberosity, and the lesser tuberosity. The fragments are not truly considered fragments unless they are separated by 1 cm or are angulated 45° or more.

e. **Non-operative Treatment Procedures (Proximal Humeral Fracture):**

- i. Impacted fractures of the humeral neck or greater tuberosity are managed non-operatively.
- ii. Isolated and minimally displaced (less than 1 cm) fractures are treated non-operatively.
- iii. Anterior or posterior dislocation associated with minimally displaced fractures can usually be reduced by closed means, but a general anesthetic is needed.
- iv. Immobilization is provided with a sling, to support the elbow, or with an abduction immobilizer if a non-impacted greater tuberosity fragment is present.
- v. Immobilization is continued for 4-6 weeks.
- vi. Shoulder rehabilitation is begun with pendulum exercises 10-14 days after injury. Subsequently, with pain control, the therapy program can be progressed with therapeutic approaches noted in Section D, Non-operative Treatment Procedures.

f. **Operative Procedures (Proximal Humeral Fracture):**

- i. Indications for operative treatment would include:
 - Unstable surgical neck fractures (no contact between the fracture fragments).

- Partially unstable fractures (only partial contact) with associated same upper extremity injuries.
- Displaced 3 and 4 part fractures may be managed by a prosthetic hemiarthroplasty and reattachment of the tuberosities.

g. Post-Operative Procedures (Proximal Humeral Fracture) would include an individualized rehabilitation program based upon communication among the physicians, surgeon and therapists.

- Refer to Section II.e., Non-Operative Treatment Procedures, Proximal Humeral Fracture.
- Schanz pins are removed from the greater tuberosity fragment at 2-3 weeks.
- Schanz pins across the humeral neck are removed at 4-6 weeks.

III. Humeral Shaft Fracture:

a. History and Initial Diagnostic Procedures (Humeral Shaft Fracture):

- Mechanism of Injury: a direct blow can fracture the humeral shaft at the junction of its middle and distal thirds; twisting injuries to the arm will cause a spiral humeral shaft fracture; high energy (velocity or crush) will cause a comminuted humeral shaft fracture.

b. Physical Findings (Humeral Shaft Fracture) may include:

- Deformity of the arm;
- Bruising and swelling; and/or
- Possible sensory and/or motor dysfunction of the radial nerve.

c. Laboratory Tests (Humeral Shaft Fracture) are not indicated unless a systemic illness or disease is suspected.

- d. **Testing Procedures (Humeral Shaft Fracture):**
- i. Plain x-rays including AP view and lateral of the entire humeral shaft.
 - ii. Vascular studies if the radial pulse is absent.
 - iii. Compartment pressure measurements if the surrounding muscles are swollen, tense and painful and particularly if the fracture resulted from a crush injury.
- e. **Non-operative Treatment Procedures (Humeral Shaft Fracture):**
- i. Most isolated humeral shaft fractures can be managed non-operatively.
 - ii. A coaptation splint may be applied. The splint is started in the axilla, extended around the elbow and brought up to the level of the acromion. It is held in place with large elastic bandages.
 - iii. At 2-3 weeks after injury, a humeral fracture orthosis may be used to allow for full elbow motion.
- f. **Operative Procedures (Humeral Shaft Fracture):**
- i. Indications for operative care would include:
 - Open fracture;
 - Associated forearm or elbow fracture (i.e., the floating elbow injury);
 - Burned upper extremity;
 - Associated paraplegia;
 - Multiple injuries (polytrauma);
 - A radial nerve palsy which came on after closed reduction; and/or

- Pathologic fracture related to an occupational injury.
- ii. Accepted methods of internal fixation include:
 - A broad plate and screws; and/or
 - Intramedullary rodding with or without cross-locking screws.
- g. **Post-Operative Procedures (Humeral Shaft Fracture)** would include an individualized rehabilitation program based upon communication among the physicians, the surgeon and the therapists. Following rigid internal fixation, therapy may be started to obtain passive and later active shoulder motion using appropriate therapeutic approaches as seen in Section III.e., Non-Operative Treatment Procedures, Humeral Shaft Fracture. Active elbow and wrist motion may be started immediately.

IV. Scapular Fracture:

- a. **History and Mechanism of Injury (Scapular Fracture):**
 - i. Mechanism of Injury: these are the least common of the fractures about the shoulder and include acromial, glenoid, glenoid neck and scapular body fractures. With the exception of anterior glenoid lip fractures caused by an anterior shoulder dislocation, all other scapular fractures are due to a high energy injury.
- b. **Physical Findings (Scapular Fracture) may include:**
 - i. Pain about the shoulder and thorax;
 - ii. Bruising and abrasions;
 - iii. Possibility of associated humeral or rib fractures; and/or
 - iv. Vascular problems (pulse evaluation and Doppler examination).

- c. **Laboratory Tests (Scapular Fracture):** Because of the association of high energy trauma, may include a complete blood count, urinalysis and chest x-ray.
- d. **Testing Procedures (Scapular Fracture):**
 - i. X-ray trauma series (3 views) are needed: AP view, axillary view, and a lateral view in the plane of the scapula.
 - ii. Arteriography if a vascular injury is suspected.
 - iii. Electromyographic exam if nerve injuries are noted.
- e. **Non-operative Treatment Procedures (Scapular Fracture):**
 - i. Non-displaced acromial, coracoid, glenoid, glenoid neck and scapular body fractures may all be treated with the use of a shoulder immobilizer.
 - ii. Pendulum exercises may be started within the first week.
 - iii. Progress to assisted range of motion exercises at 3-4 weeks using appropriate therapeutic procedures.
- f. **Operative Treatment (Scapular Fracture):**
 - i. Acromial fractures which are displaced should be internally fixed to prevent a nonunion. These fractures may be fixed with lagged screws and a superiorly placed plate to neutralize the muscular forces.
 - ii. Glenoid fractures which are displaced greater than 2-3 mm should be fixed internally. The approach is determined by studying the results of a CT scan.
 - iii. Scapular body fractures require internal fixation if the lateral or medial borders are displaced to such a degree as to interfere with scapulothoracic motion.

iv. Displaced fractures of the scapular neck and the ipsilateral clavicle require internal fixation of the clavicle to reduce the scapular neck fracture.

g. **Post-Operative Procedures (Scapular Fracture)** would include an individualized rehabilitation program based upon communication among the physicians, the surgeon and the therapists. A shoulder immobilizer is utilized, pendulum exercises at one week, deltoid isometric exercises are started early, and, at 4-6 weeks, active range of motion is commenced.

V. **Sternoclavicular Dislocation/Fracture:**

a. **History and Mechanism of Injury (Sternoclavicular Dislocation/Fracture):**

i. Mechanism of Injury: established with sudden trauma to the shoulder/ anterior chest wall; anterior dislocations of the sternoclavicular joint usually do not require active treatment; however, symptomatic posterior dislocations will require reduction.

b. **Physical Findings (Sternoclavicular Dislocation/Fracture) may include:**

- i. Pain at the sternoclavicular area;
- ii. Abrasions on the chest wall, clavicle and shoulder can be seen;
- iii. Deformities can be seen in the above regions; and/or
- iv. Pain with palpation and motion at the sternoclavicular joint area.

c. **Laboratory Tests (Sternoclavicular Dislocation/Fracture)** are not indicated unless a systemic illness or disease is suspected.

d. **Testing Procedures (Sternoclavicular Dislocation/Fracture):**

- i. Plain x-rays of the sternoclavicular joint are routinely done. When indicated, comparative views of the contralateral limb may be necessary.
- ii. X-rays of other shoulder areas and chest wall may be done if clinically indicated.
- iii. Vascular studies should be considered if the history and clinical examination indicate extensive injury.

e. **Non-operative Treatment Procedures (Sternoclavicular Dislocation /Fracture):**

- i. Symptomatic posterior dislocations should be reduced in the operating room under general anesthesia.
- ii. Immobilize with a sling for 3-4 weeks. Subsequently, further rehabilitation may be utilized using procedures set forth in Section D, Non-operative Treatment Procedures.
- iii. Medications, such as analgesics, nonsteroidal anti-inflammatories and antidepressants may be indicated; narcotics may be indicated acutely for fracture and should be prescribed as indicated for limited periods.
- iv. Manipulation (for Sternoclavicular Dislocation):
Manipulative treatment (not therapy) is defined as the therapeutic application of manually guided forces by an operator to improve physiologic function and/or support homeostasis that has been altered by the injury or occupational disease, and has associated clinical significance.
 - Time to produce effect for shoulder treatment:
1-6 treatments

f. **Operative Procedures (Sternoclavicular Dislocation/Fracture)** are not recommended.

10. **SHOULDER INSTABILITY:** Subluxation (partial dislocation) or dislocation of the glenohumeral joint in either an anterior, interior, posterior or multidirectional position.

a. **History and Mechanism of Injury (Shoulder Instability):**

- i. Mechanism of Injury: instability should be apparent following a direct traumatic blow to the shoulder, or indirectly by falling on an outstretched arm, or while applying significant traction to the arm, or may also develop with a cumulative trauma to the shoulder. Symptoms should be exacerbated or provoked by work and initially alleviated with a period of rest. Symptoms may be exacerbated by other activities that are not necessarily work-related (e.g., driving a car).
- ii. History may include:
 - A slipping sensation in the arm;
 - Severe pain with inability to move the arm;
 - Abduction and external rotation produce a feeling that the shoulder might "come out"; or
 - Feeling of shoulder weakness.
- iii. In subacute and/or chronic instabilities, age of onset of instability is important in the history. Older age group (over age 30) has a propensity not to re-dislocate. Younger age groups need a more aggressive treatment plan.
- iv. Avoid any aggressive treatment in patients with history of voluntary subluxation or dislocation. These patients may need a psychiatric evaluation.

b. Physical Findings (Shoulder Instability) may include:

- i. Anterior dislocations would likely include loss of normal shoulder contour; a fullness in the axilla; pain over the shoulder with any motion and often the patient holding the extremity in a very still position;
- ii. Posterior dislocations usually occur with a direct fall on the shoulder or outstretched arm resulting in posteriorly directed forces to the humeral head. These patients present with inability to externally rotate the shoulder;
- iii. Neurologic examination could reveal most commonly axillary nerve injuries, but occasionally musculocutaneous nerve injuries are seen; and/or

- iv. Abduction and external rotation positioning will produce pain in those who have anterior instability. Direct posterior stress in a supine position will produce pain in those with posterior instability. Longitudinal traction will produce a "sulcus sign" (a large dimple on the lateral side of the shoulder) when there is inferior instability.
- c. **Laboratory Tests (Shoulder Instability)** are not indicated unless a systemic illness or disease is suspected.
- d. **Testing Procedures (Shoulder Instability):**
 - i. Plain x-rays to rule out bony deficit on the glenoid, including AP, axillary view, lateral in the plane of the scapula and possibly the West Point view. Axillary view to identify larger Hill-Sachs lesion of humeral head.
 - ii. On more difficult diagnostic cases with subtle history and physical findings suggesting instability, MRI, or a CT assisted arthrogram or MRI assisted arthrogram may be ordered for lateral detachment after 4-8 weeks of therapy. (This is done only after other conservative therapies have failed.)
- e. **Non-operative Treatment Procedures (Shoulder Instability):**
 - i. First-Time Acute Severe Bony Involvement:
 - Therapeutic Procedures
 - ◆ Immobilization
 - ◆ Therapeutic Exercise
 - ◆ Alteration of Occupation and Work Station
 - ◆ Thermal Treatment
 - ◆ Ultrasound
 - ◆ TENS is not recommended
 - May not return to work with overhead activity or lifting with involved arm until cleared by physician for heavier activities.

- Additional modalities may include:
 - ◆ Physical Medicine and Rehabilitation
 - Instruction in Therapeutic Exercise and Proper Work Techniques
 - Manual Therapy Techniques
 - ◆ Biofeedback is not recommended
 - ◆ Medications
 - Analgesics
 - Anti-inflammatories
- ii. Acute or chronic dislocations with large fracture fragments contributing to instability:
 - Attempt to treat with immobilization if in acceptable position, otherwise repair surgically.
 - Return-to-work may be directly related to time it takes for the fracture to heal.
- iii. Subacute and/or chronic instability:
 - Provocative dislocation should first be treated similarly to acute dislocation.
 - If acute treatment is unsuccessful, and still having findings of instability, consider operative repair.
- f. **Operative Procedures (Shoulder Instability):**
 - i. Identify causative agent for the instability (i.e., labral detachment, bony lesion, or multidirectional instability), then proceed with:
 - Bony block transfer;
 - Capsular tightening; or
 - Bankart lesion repair.

- g. **Post-Operative Procedures (Shoulder Instability)** would include an individualized rehabilitation program based upon communication among the physicians, the surgeon and the therapists. Depending upon the type of surgery, the patient will be immobilized for 3-6 weeks. As soon as it is safe to proceed without damaging the repair, progressive therapy with consultation involving an occupational and/or physical therapist should begin with therapeutic exercise, physical medicine and rehabilitation. During this period of time, the patient could resume working when:
- i. Medications which would predispose to injury are no longer being prescribed or used; and
 - ii. The treating physician has cleared the patient for the specific vocational activities.

C. MEDICATIONS

Medication use in the treatment of shoulder injuries is appropriate for controlling acute and chronic pain and inflammation. Use of medications will vary widely due to the spectrum of injuries.

All drugs should be used according to patient needs. A thorough medication history, including use of alternative and over-the-counter medications, should be performed at the time of the initial visit and updated periodically. Treatment for pain control is initially accomplished with acetaminophen and/or NSAIDs. The patient should be educated regarding the interaction with prescription and over-the-counter medications as well as the contents of over-the-counter herbal products.

The following medications are listed in alphabetical order:

1. **ACETAMINOPHEN**: is an effective analgesic with antipyretic but not anti-inflammatory activity. Acetaminophen is generally well tolerated, causes little or no gastrointestinal irritation, and is not associated with ulcer formation. Acetaminophen has been associated with liver toxicity in overdose situations or in chronic alcohol use. Patients may not realize that many over-the-counter preparations may contain acetaminophen. The total daily dose of acetaminophen is recommended not to exceed 4 grams per 24-hour period from all sources, including narcotic-acetaminophen combination preparations.
 - Optimum Duration: 7 to 10 days.

- Maximum Duration: Chronic use as indicated on a case-by-case basis.
2. **HYPNOTICS** may be given to shoulder injury sufferers because of a chief complaint of "inability to sleep." Such medications must be used with caution because of their dependence-producing capabilities. As an alternative, sedating tricyclic antidepressants may be considered when necessary. Physical methods of restoring a normal sleep pattern can usually be employed as an alternative to medication.
- Time to produce effect: 1-3 days.
 - Frequency: At night.
 - Optimum duration: 1 week.
 - Maximum duration: 2-3 weeks
3. **NARCOTICS** should be primarily reserved for the treatment of severe shoulder pain. In mild-to-moderate cases of shoulder pain, narcotic medication should be used cautiously on a case-by-case basis. Adverse effects include respiratory depression, the development of physical and psychological dependence, and impaired alertness. This medication has physically addictive properties and withdrawal symptoms may follow abrupt discontinuation.
- Narcotic medications should be prescribed with strict time, quantity, and duration guidelines, and with definitive cessation parameters. Pain is subjective in nature and should be evaluated using a scale to rate effectiveness of the narcotic prescribed. Any use beyond the maximum should be documented and justified based on the diagnosis and/or invasive procedures.
- Optimum Duration: 3-7 days.
 - Maximum Duration: 2 weeks. Use beyond two weeks is acceptable in appropriate cases.
4. **NONSTEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDs)** are useful for pain and inflammation. In mild cases, they may be the only drugs required for analgesia. There are several classes of NSAIDs, and the response of the individual patient to a specific medication is unpredictable. For this reason, a range of NSAIDs may be tried in each case with the most effective preparation being continued. Patients should be closely

monitored for adverse reactions. The US Food and Drug Administration advises that many NSAIDs may cause an increased risk of serious cardiovascular thrombotic events, myocardial infarction, and stroke, which can be fatal. Naproxen sodium does not appear to be associated with increased risk of vascular events. Administration of proton pump inhibitors, histamine 2 blockers, or prostaglandin analog misoprostol along with these NSAIDs may reduce the risk of duodenal and gastric ulceration but do not impact possible cardiovascular complications. Due to the cross-reactivity between aspirin and NSAIDs, NSAIDs should not be used in aspirin-sensitive patients, and should be used with caution in all asthma patients. NSAIDs are associated with abnormal renal function, including renal failure, as well as abnormal liver function. Certain NSAIDs may have interactions with various other medications. Individuals may have adverse events not listed above. Intervals for metabolic screening are dependent upon the patient's age, general health status and should be within parameters listed for each specific medication. Complete blood count (CBC), and liver and renal function should be monitored at least every six months in patients on chronic NSAIDs and initially when indicated.

i. Non-Selective Nonsteroidal Anti-Inflammatory Drugs (Includes NSAIDs and acetylsalicylic acid (aspirin))

Serious GI toxicity, such as bleeding, perforation, and ulceration can occur at any time, with or without warning symptoms in patients treated with traditional NSAIDs. Physicians should inform patients about the signs and/or symptoms of serious gastrointestinal toxicity and what steps to take if they occur. Anaphylactoid reactions may occur in patients taking NSAIDs. NSAIDs may interfere with platelet function. Fluid retention and edema have been observed in some patients taking NSAIDs.

- Optimal Duration: 1 week.
- Maximum Duration: 1 year.

ii. Selective Cyclo-Oxygenase-2 (COX-2) Inhibitors

Selective cyclo-oxygenase-2 (COX-2) inhibitors are more recent NSAIDs and differ in adverse side effect profiles from the traditional NSAIDs. The major advantages of selective COX-2 inhibitors over traditional NSAIDs are that they have less gastrointestinal toxicity and no platelet effects. COX-2 inhibitors can worsen renal function

in patients with renal insufficiency, thus renal function may need monitoring.

COX-2 inhibitors should not be first-line for low risk patients who will be using an NSAID short term but are indicated in select patients for whom traditional NSAIDs are not tolerated. Serious upper GI adverse events can occur even in asymptomatic patients. Patients at high risk for GI bleed include those who use alcohol, smoke, are older than 65, take corticosteroids or anti-coagulants, or have a longer duration of therapy. Celecoxib is contraindicated in sulfonamide allergic patients.

Selective COX-2 inhibitors should be used with great caution in patients with ischemic heart disease and/or stroke and avoided in patients with risk factors for coronary heart disease. Patients with known cardiovascular disease or multiple risk factors for cardiovascular disease should have the risks and benefits of NSAID therapy for pain discussed. In these patients, it appears to be safest to use acetaminophen or aspirin as the first-line therapy. If needed, NSAIDs that are non-selective are preferred over COX-2 specific drugs. Patients who receive COX-2 inhibitors should take the lowest effective dose for the shortest time necessary to control symptoms. Even a relative lack of COX-2 selectivity does not completely eliminate the risk of cardiovascular events, and in that regard, all drugs in the NSAID spectrum should only be prescribed after thorough consideration of risk/benefit balance. In patients receiving low-dose aspirin for primary or secondary cardiovascular disease prevention, to minimize the potential for the NSAID to counteract the beneficial effects of aspirin, aspirin should be taken at least 2 hours before or at least 8 hours after the NSAID.

- Optimal Duration: 7-10 days
- Maximum Duration: Chronic use is appropriate in individual cases.

5. **PSYCHOTROPIC/ANTI-ANXIETY MEDICATIONS**: Not recommended.

6. **SKELETAL MUSCLE RELAXANTS**: Not recommended.

7. **TOPICAL DRUG DELIVERY**:

- i. Topical Salicylates and Nonsalicylates have been shown to be effective in relieving pain in acute and chronic musculoskeletal

conditions. Topical salicylate and nonsalicylates achieve tissue levels that are potentially therapeutic, at least with regard to COX inhibition. Other than local skin reactions, the side effects of therapy are minimal, although not nonexistent, and the usual contraindications to use of these compounds need to be considered. Local skin reactions are rare and systemic effects even less common. Their use in patients receiving warfarin therapy may result in alterations in bleeding time. Overall, the low level of systemic absorption can be advantageous; allowing the topical use of these medications when systemic administration is relatively contraindicated, such as is the case in patients with hypertension, cardiac failure, or renal insufficiency.

- Optimal duration: 1-2 weeks to determine effectiveness.
- Continued use should be evaluated every 3 months.

ii. Capsaicin is another medication option for topical drug use in lower extremity injury. Capsaicin offers a safe and effective alternative to systemic NSAID therapy. Although it is quite safe, effective use of capsaicin is limited by the local stinging or burning sensation that typically dissipates with regular use, usually after the first 7 to 10 days of treatment. Patients should be advised to apply the cream on the affected area with a plastic glove or cotton applicator and to avoid inadvertent contact with eyes and mucous membranes.

- Optimal duration: 1-2 weeks to determine effectiveness.
- Continued use should be evaluated every 3 months.

8. **TRAMADOL** is useful in relief of pain and has been shown to provide pain relief equivalent to that of commonly prescribed NSAIDs. Although Tramadol may cause impaired alertness, it is generally well tolerated, does not cause gastrointestinal ulceration, or exacerbate hypertension or congestive heart failure. Tramadol should be used cautiously in patients who have a history of seizures or who are taking medication that may lower the seizure threshold, such as monoamine oxidase (MAO) inhibitors, SSRIs, and tricyclic antidepressants. This medication has physically addictive properties and withdrawal symptoms may follow abrupt discontinuation. It is not recommended for those with prior opioid addiction.

- Maximum Duration: 2 weeks. Use beyond 2 weeks is acceptable in appropriate cases.

D. NON-OPERATIVE TREATMENT PROCEDURES

1. **IMMOBILIZATION:** Time is dependent upon type of injury, then progress with muscle girdle strengthening.
 - Time to produce effect: 1 day.
 - Frequency: Once.
 - Optimum duration: 1 week.
 - Maximum duration: 12 weeks.

The arm is immobilized in a sling for 1-12 weeks post-injury, depending upon the age of the patient. The patient is instructed in isometric exercises while in the sling for the internal and external rotators and the deltoid.

2. **RELATIVE REST** may last 3-5 weeks and require job modification/modified duty so as not to exacerbate the acute inflamed shoulder.
3. **THERAPEUTIC EXERCISE** where the therapist instructs the patient in a supervised clinic and home program to increase strength of the supporting shoulder musculature. Motions and muscles to be strengthened include shoulder internal and external rotators, abductors and scapula stabilizers. Isometrics are performed initially, progressing to isotonic exercises as tolerated.
 - Frequency of visits: 2-3 times/week for 8-12 weeks.
 - Weeks 1-3: Isometrics in sling.
 - Weeks 3-8: Progressive isotonic exercises.
 - Weeks 8-12: Begin overhead activities when the rotator cuff strength is normalized and full active elevation has been achieved.
4. **ALTERATION OF OCCUPATION AND WORK STATION:** Early evaluation and training of body mechanics and joint protection and other ergonomic factors is essential and should be done by a qualified individual. Ergonomic risk factors to be addressed include repetitive overhead work, lifting and/or tool use.

5. **SUPERFICIAL HEAT AND COLD:** Superficial heat and cold therapies are thermal agents applied in various manners that lower or raise the body tissue temperature for the reduction of pain, inflammation, and/or effusion resulting from injury or induced by exercise. It may be used acutely with compression and elevation. Indications include acute pain, edema and hemorrhage, need to increase pain threshold, reduce muscle spasm and promote stretching/flexibility. Includes portable cryotherapy units. May be performed in conjunction with other active therapy, or may be self-administered by the patient.

- Time to produce effect: Immediate.
- Frequency: 2-5 times per week.
- Optimum duration: 3 weeks as primary, or up to 2 months if used intermittently as an adjunct to other therapeutic procedures, or longer for adhesive capsulitis (Refer to Section 2, Adhesive Capsulitis).
- Maximum duration: 2 months.

6. **TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS)** treatment should include at least one instructional session for proper application and use. Indications include muscle spasm, atrophy and control of concomitant pain in the office setting. Minimal TENS unit parameters should include pulse rate, pulse width and amplitude modulation. Consistent, measurable, functional improvement must be documented and determination of the likelihood of chronicity prior to the provision of a home unit. TENS treatment should be used in conjunction with active physical therapy.

- Time to Produce Effect: Immediate.
- Frequency: Variable.
- Optimum Duration: 3 sessions.
- Maximum Duration: 3 sessions. Purchase or provide with home unit if effective.

7. **THERAPEUTIC ULTRASOUND WITH OR WITHOUT ELECTRIC STIMULATION** using sonic generators to deliver acoustic energy for therapeutic thermal and/or non-thermal soft tissue treatment. Indications

include scar tissue, adhesions, collagen fiber and muscle spasm, and the need to extend muscle tissue or accelerate the soft tissue healing.

- Time to produce effect: 6-15 treatments.
- Frequency: 3 times/week.
- Optimum duration: 4 weeks, or longer for adhesive capsulitis. (See Adhesive Capsulitis.).

8. **ELECTRICAL THERAPEUTIC MODALITY** can be utilized as an adjunct for recovery. In order to justify its use, one must provide documentation regarding functional gains.

- Time to produce effect: 8-12 sessions.
- Frequency: 3 times/week.
- Optimum duration: 4 weeks.

9. **RETURN-TO-WORK:** May return to work with no overhead activity, lifting, or repetitive motion with the involved arm until cleared by the primary treating physician for heavier activities. Each case regarding task tolerance should be individualized based on the diagnosis and job demands.

10. **BIOFEEDBACK:** Not recommended.

11. **PHYSICAL MEDICINE AND REHABILITATION:**

a. **Instruction in Therapeutic Exercise and Proper Work**

Techniques: An active therapeutic exercise program may be beneficial and should contain elements of improving patient flexibility, mobility, posture/body mechanics, activities of daily living, splinting, bracing, sensory reeducation, endurance, strength and education.

- Time to produce effect: 2 weeks.
- Frequency: 2-3 times/week.
- Optimum duration: 4-6 weeks, or longer for cases of adhesive capsulitis. (Refer to Section 2, Adhesive Capsulitis.)

- Maximum duration: 12 weeks.
- b. **Manual Therapy Techniques:** Soft tissue mobilization/ manipulation techniques may be used as an adjunctive treatment modality.
- c. **Post-Operative Treatment** may include scar/adhesion reduction techniques.

APPENDIX

Sources:

This Treatment Guideline is adopted, with modifications, from the State of Colorado's Shoulder Injury Medical Treatment Guideline with supplementation from ACOEM's¹ Occupational Medicine Treatment Guidelines and the State of Washington's Medical and Surgical Treatment Guidelines.

¹ American College of Occupational and Environmental Medicine
Shoulder Injury