Pain in the shoulder and shoulder girdle is common in the general population, with a prevalence of 15% to 25% in the 40- to 50-year-old age group. With increasing life expectancy and the aging population remaining active into advancing years, age-related degeneration is a significant factor in rotator cuff injuries. Disorders of the shoulder region account for 30% to 40% of industrial complaints and have increased sixfold in the past decade. Although injuries to the shoulder girdle account for only 5% to 10% of sports injuries, they represent a much higher percentage of physician visits, probably because they are perceived as being serious or disabling by the athlete. In many shoulder disorders, it is the soft tissue, such as the tendons and joint capsule, that is the source of the pain. The shoulder region may also be painful from a referral from the cervical and the thoracic spines and from visceral diseases, such as gallbladder and cardiac problems.
spine and the thoracic spine influence mobility of the arm. The upper thoracic vertebrae must be able to extend, rotate, and side-bend to accomplish full elevation of the arm.\(^1\) There must also be mobility in the upper ribs as well as mobility in the acromioclavicular and sternoclavicular joints for full range of motion (ROM) in the arm. Stability of the scapula is necessary to allow proper positioning of the head of the humerus in the glenoid fossa of the scapula.

Normal neurological function is necessary for adequate strength and stability. Dysfunction of the nervous system can come from the cervical or thoracic spine, reflex inhibition from irritated mechanoreceptors from the joint (arthrokinetic reflex), atrophy due to prior injury, or immobilization.

Most shoulder disorders are not isolated injuries but affect several structures in the region.

### BONES AND JOINTS OF THE SHOULDER GIRDLE

#### SCAPULA

The scapula or shoulder blade is a flat, triangular bone (Fig. 6-2). The resting position of the scapula covers the second to seventh ribs, and the vertebral border is approximately 2 inches from the midline. The posterior aspect has a bony ridge called the spine of the scapula that extends laterally as a bony enlargement called the acromion. The acromion articulates with the clavicle, forming the acromioclavicular (AC) joint. Above the spine is a deep cavity or fossa that contains the supraspinatus muscle belly. Below the spine are the infraspinatus and the teres minor and major. On the anterior surface is a fossa where the subscapularis muscle attaches. There are 15 muscles that attach to the scapula.

On the anterior-superior surface of the scapula is a bony process called the coracoid process, which is a point of attachment for three muscles and three ligaments. The muscles are the pectoralis minor, the short head of the biceps brachii, and the coracobrachialis. The three ligaments are the coracoclavicular, the coracohumeral, and the coracoacromial.
The glenoid fossa is a shallow cavity on the lateral aspect of the scapula that serves as the articulation for the head of the humerus. In the normal resting position, the glenoid fossa faces laterally, anteriorly, and superiorly. Two body processes lie on the top and bottom of the glenoid fossa: the supragnoidal tubercles for the attachment of the long head of the biceps and triceps, respectively.

**CLAVICLE**

- The clavicle or collarbone is an S-shaped bone, convex anteriorly in the medial two-thirds and concave anteriorly in the lateral one-third. It articulates with the sternum medially, forming the sternoclavicular joint, which connects the upper extremity to the axial skeleton. It articulates with the acromion of the scapula laterally, forming the AC joint. It is the attachment site of six muscles and a number of ligaments.

- **Dysfunction and injury:** Fracture of the clavicle is quite common, particularly in sports. Although it heals quickly, it typically heals with the ends overlapping, shortening the clavicle and narrowing the space underneath. The brachial plexus, the group of nerves from the neck that innervates the arm, travels under the clavicle in what is called the thoracic outlet. A broken collarbone or other injuries leading to fibrosis in the fascia attaching to the clavicle or a rounded-shoulder, forward-head posture (FHP) closes down this space and contributes to thoracic outlet syndrome.

**STERNUM**

- The sternum or breastbone is a flat bone located in the center of the chest. It is divided into three parts: the manubrium, body, and xiphoid. The manubrium articulates with the clavicle and first rib at its superior-lateral aspect and with the second rib at the inferior-lateral aspect. The body provides an attachment site for the other ribs, forming the sternocostal joint. The xiphoid is the inferior tip. The sternum functions to protect the heart and lungs.

**STERNoclAVICULAR JOINT**

- The sternoclavicular joint is a synovial joint in which the sternal end of the clavicle articulates with the upper lateral edge of the sternum, as well as the first rib (see Fig. 6-1)

- **Structure:** The sternoclavicular joint has a strong joint capsule, an articular disc, and three major ligaments.
  - The three ligaments of the sternoclavicular joint are the costoclavicular ligament, the interclavicular ligament, and the anterior and posterior sternoclavicular ligaments.
  - The articular disc, or meniscus, is a fibrocartilage that helps to distribute the forces between the two bones. It is attached to the clavicle, first rib, and sternum.

- **Function:** The sternoclavicular joint has five possible motions: elevation, depression, protraction, retraction, and rotation.

- **Dysfunction and injury:** The sternoclavicular joint is so strong that the clavicle will break or the AC joint will dislocate before the sternoclavicular joint dislocates.¹

**ACROMIOCLAVICULAR JOINT**

- The AC joint is a synovial joint in which the lateral aspect of the clavicle articulates with the acromion of the scapula (see Fig. 6-5 on p. 245).

- **Structure:** It has a weak joint capsule, a fibrocartilage disc, and two strong ligaments.

- The ligaments are the superior and inferior AC ligaments and the coracoclavicular ligament, which is divided into the lateral trapezoid and medial...
conoid portions. These ligaments function to suspend the scapula from the clavicle and to prevent posterior and medial motion of the scapula, as in falling on an outstretched hand (FOOSH) injury.

**Function:** Approximately 30° of rotation of the clavicle can occur at the AC and sternoclavicular joints as the arm is elevated. The clavicle rolls superiorly and posteriorly after approximately 90° of abduction.

- The rotation of the scapula, and hence the upward and downward movement of the glenoid fossa, occurs at the AC joint.

**Dysfunction and injury:** A fall on the shoulder can tear the AC ligament and cause the clavicle to ride on top of the acromion, which is called a shoulder separation. This is visible when observing the client from the anterior view and is called step deformity. The AC joint may degenerate because of repetitive stresses such as heavy lifting or prior injury. Pain is typically felt on the anterior and superior aspects of the shoulder and refers to the anterolateral neck.

### SCAPULOTHORACIC JOINT

- The scapulothoracic joint describes the relationship of the scapula to the rib cage (see Fig. 6-2). It is not a true joint with a synovial capsule, but a functional joint, as the scapula moves on top of the thoracic cage.

**Function:** The critical functions of the scapulothoracic joint are to allow for proper positioning of the glenoid fossa for arm motion and to stabilize the scapula for efficient arm motion. The scapula makes approximately a 30° to 45° angle anteriorly as it rests on the thoracic cage. This angle is called the scapular plane.

- There are six motions of the scapulothoracic joint: elevation, depression, adduction, abduction, and upward and downward rotation, which describes the movement of the inferior angle of the scapula moving away from or toward the vertebral column.

- The scapula has static and dynamic stabilizers. The static stabilizers are the joint capsule and ligaments, and the principle dynamic stabilizers are the rhomboids, trapezius, levator scapula, and serratus anterior. The static and dynamic stabilizers work in concert to provide a stable position of the scapula to allow optimum arm motion.

**Dysfunction and injury:** It is common for the dynamic stabilizers of the shoulder to be weak. During our assessment, this is manifested as winging of the scapula and excessive scapular motion when the client does a wall pushup (see “Shoulder Assessment,” p. 262). Decreased scapular stability contributes to protracted scapula (i.e., the scapula moves away from the spine). As the scapula slides laterally, the optimal length–tension relationship of the muscles of the glenohumeral joint is lost, which results in weakness of the muscles of the arm. This is often caused by rounded shoulders and a FHP. As the scapula rides forward on the rib cage, the superior portion rotates downward, and the glenoid fossa no longer faces upward. This inhibits the normal abduction of the arm, contributing to impingement of the rotator cuff, subacromial bursa, and biceps tendon between the greater tuberosity of the humerus and the acromion or coracoacromial ligament. For many other clients who have FHP, the scapula is held in a retracted position owing to short and tight rhomboids. These clients typically do not develop impingement syndrome.

**Treatment implications:** Perform MET to release the muscles attached to the scapula, scapulothoracic mobilization, and soft tissue mobilization (STM) of the short and tight muscles. May require referral to a physical therapist or personal trainer for strength and stabilization training.

### BONES AND SOFT TISSUE OF THE GLENOHUMERAL JOINT

#### GLENOHUMERAL JOINT

**Structure:** The glenohumeral joint is a ball-and-socket synovial joint consisting of the shallow glenoid fossa of the scapula and the large, rounded head of the humerus (Fig. 6-3). It contains a joint capsule, a fibrocartilage rim called a labrum, and numerous ligaments.

**Function:** The glenohumeral joint has the greatest ROM of any joint in the body, but it sacrifices stability for mobility. It is described as an incongruous joint, meaning that the humerus and glenoid fossa barely make contact with each other at rest. In arm motion, only 30% of the head of the humerus is in contact with the glenoid fossa. It is held in the normal resting position by the superior joint capsule and the coracohumeral ligament. This is different from the hip joint, in which two-thirds of the head of the femur is within the acetabulum, and the two articulating surfaces fit closely together.

**Because the glenohumeral joint is incongruous, the muscles play a dual role of support and motion. The muscles must maintain the proper alignment of the head of the humerus to the glenoid fossa as the arm is moving.**
The glenohumeral joint has six basic motions: flexion, extension, abduction, adduction, and medial and lateral rotation. Abduction is easier in the plane of the scapula, which is 30° to 45° of forward flexion, because the joint capsule is more lax, and the greater tuberosity of the humerus is not abutting against the acromion at this angle. This is the most natural and functional position of abduction. Patients who have shoulder pain typically abduct their arm in this plane.

Elevation of the arm is a combination of rolling and inferior sliding of the humeral head in the glenoid fossa, which requires strength of all the rotator cuff muscles to hold the humeral head stable as the arm is being elevated. As the deltoid muscle abducts the arm, the supraspinatus pulls the head of the humerus into the glenoid fossa, and the infraspinatus, teres minor, and subscapularis contract and pull the humeral head inferiorly. This action creates enough room for the humeral head to slide under the acromion. If the cuff muscles are dysfunctioning and weak, the humeral head migrates superiorly creating an impingement of the delicate soft tissue structures between the humeral head and the acromion. These clients typically require treatment with a physical therapist or a personal trainer to guide them in proper exercise. Degeneration is treated with STM for the short and tight muscles; joint mobilization to increase accessory motion between the head of the humerus and glenoid fossa and to increase ROM; and MET to release hypertonic muscles and recruit weak, inhibited muscles.

**Dysfunction and injury:** Because of the poor congruency of the humeral head in the glenoid fossa, this joint is susceptible to dislocation and subluxation (partial dislocation). Acute traumatic dislocation is predominantly an injury of young adults, caused by forced external rotation and extension of the arm, dislocating the humerus in the forward, medial, and inferior direction. Instability of the glenohumeral joint is a common problem, and anterior instability is the most common direction. The instability may be attributable to traumatic dislocation, rotator cuff injury or weakness, or acquired or congenital joint laxity. Acquired instability is caused by prior or recurrent dislocations or by treatment failure of the initial injury. The joint may develop degenerative joint disease, which involves a wearing of the articular cartilage, from prior injury or chronic instability.

**Treatment implications:** It is important for the massage therapist to appreciate that certain conditions require stabilization and strengthening rather than to assume that all clients need release of muscle tension. If your assessment findings or doctor’s diagnosis indicate glenohumeral instability, use contract-relax (CR) muscle energy technique (MET) in the rotator cuff and muscles stabilizing the scapula to help facilitate their normal function. Typically, there is weakness in the supraspinatus and lateral rotators, which allows the head of the humerus to migrate superiorly creating an impingement of the delicate soft tissue structures between the humeral head and the acromion. These clients typically require treatment with a physical therapist or a personal trainer to guide them in proper exercise. Degeneration is treated with STM for the short and tight muscles; joint mobilization to increase accessory motion between the head of the humerus and glenoid fossa and to increase ROM; and MET to release hypertonic muscles and recruit weak, inhibited muscles.

**HUMERUS**

The humerus or arm bone consists of a body and upper (proximal) and lower (distal) ends. The humeral head forms the upper end. On the anterolateral surface is the greater tubercle, and on the anteromedial surface is the lesser tubercle. Between these two bony prominences is the intertubercular groove, which contains the tendon of the long head of the biceps. The greater tubercle is an attachment site for the supraspinatus, infraspinatus, and teres minor. The lesser tubercle is the attachment site for thoracic and lower cervical spine bends. Thus, thoracic hypomobility prevents full abduction.
JOINT CAPSULE

- **Structure:** The joint capsule originates from the glenoid labrum and attaches to the periosteum of the humerus (Fig. 6-4). There is a synovial lining throughout the capsule that is reinforced posteriorly and superiorly by the rotator cuff muscles and anteriorly by the subscapularis tendon, pectoralis major, teres major, and the coraco-humeral and glenohumeral ligaments. The fiber of the joint capsule have a medial and forward twist with the arm hanging at the side in its resting position.

- **Function:** The twist in the joint capsule is increased with abduction and decreased with flexion. The tension in the capsule in abduction pulls the humerus into external rotation, which allows the greater tubercle of the humerus to clear the coracoacromial arch.1 The posterior capsule tightens when the arm rotates medially (internally), and the anterior capsule tightens when the arm rotates laterally (externally). The joint capsule is also involved in instability syndrome and rotator cuff tendinitis, which are addressed later in the chapter (see the sections “Instability Syndrome of the Glenohumeral Joint” and “Rotator Cuff Tendinitis”).

- **Dysfunction and injury:** A common problem to the joint capsule is called frozen shoulder or adhesive capsulitis. The joint capsule becomes fibrotic; the anterior portion of the capsule develops adhesions to the humeral head, and the folds in the capsule can adhere to themselves. This fibrosis and thickening shorten the capsule and prevent external rotation of the shoulder, which, in turn, restricts abduction. External rotation is necessary in abduction to allow the greater tuberosity to clear the coracoacromial arch. Thoracic kyphosis may be a causative factor.4 Tightness in the posterior joint capsule results in an anterior superior migration of the humeral head, creating an impingement of the soft tissue under the acromion.

- **Treatment implications:** The treatment of frozen shoulder is a tremendous challenge. Passive traction and MET provide the most comfortable and effective therapy. The first motion to introduce for frozen shoulder is inferior glide, which reduces sustained muscle tension and stretches the joint capsule. Next, perform CR MET to increase external rotation, as this allows the greater tuberosity to roll under the coracoacromial arch for abduction. Finally, perform postisometric relaxation (PIR) or eccentric MET to increase flexion and abduction, first in the sagittal plane, then in the scapular plane, and finally in the coronal plane.

LABRUM

- **Structure:** The labrum is a fibrocartilage lip that surrounds the glenoid fossa (see Fig. 6-3). The outer surface of the labrum is the primary attachment site for the joint capsule and glenohumeral ligaments. The tendon of the long head of the biceps attaches to and reinforces the superior aspect of the labrum, and the long head of the triceps attaches to and reinforces the inferior aspect of the labrum.

- **Function:** The labrum functions to deepen the glenoid cavity, adding stability.

- **Dysfunction and injury:** Injuries to the labrum can result from shearing forces if the humerus is forced through extreme motions, repeated or excessive traction of the long head of the biceps tendon from its attachment, shoulder trauma such as dislocations, falls on an outstretched arm, throwing sports, and overhead work.2 The two most common tears are the Bankart lesion, which is a tear of the labrum from the anterior glenoid, and the SLAP (superior labral anterior to posterior) lesion, which is a detachment of the superior labrum–long head of the biceps complex. These tears lead to instability of the joint. Clients complain of poorly localized pain over the anterior aspect of the shoulder, exacerbated by elevation of the arm overhead and movement of the arm behind the back. Examination may demonstrate pain at the anterior shoulder with isometric contraction of the long head of the biceps (Speed’s test).

- **Treatment implications:** The treatment is to promote strength and stability of the glenohumeral
MET is applied to help recruit inhibited muscles and reduce excessive tension in the muscles. Gentle STM to promote circulation is helpful. Patients need exercise rehabilitation.

**LIGAMENTS**

- The ligaments of the glenohumeral joint are the glenohumeral, the coracohumeral, the coracoacromial, and the transverse humeral (Fig. 6-5). The joint capsule thickens in bands that are sometimes referred to as capsular ligaments. As in all joints, there is a reflex from the mechanoreceptors within the joint capsule and ligaments to the muscles surrounding the joint.7
- The glenohumeral ligament lies underneath the coracoacromial ligament, reinforcing the joint anteriorly and tightening on external rotation of the humerus.
- The coracohumeral ligament is further divided into the superior, middle, and inferior portions. It is a broad band reinforcing and interweaving with the upper part of the joint capsule. It attaches to the lateral border of the coracoid process, passing laterally to blend with the tendon of the supraspinatus, capsule, and transverse humeral ligament.
- The coracoacromial ligament is a strong triangular band attached to the edge of the acromion just in front of the articular surface for the clavicle and to the entire length of the lateral border of the coracoid process.

- The transverse humeral ligament crosses the intertubercular groove to stabilize the tendon of the long head of the biceps.

**CORACOACROMIAL ARCH**

- **Structure:** The coracoacromial arch consists of the coracoid process anteriorly, the acromion posteriorly, and the coracoacromial ligament in between them (see Fig. 6-5). In the arch space lie the head of the humerus below; the coracoacromial ligament and acromion above; and the joint capsule, the supraspinatus and infraspinatus tendons, the long head of the biceps, and the subdeltoid bursa in between.
- **Function:** The coracoacromial ligament prevents dislocation of the humeral head superiorly, and along with the acromion and coracoid process, it forms an important protective arch. It also acts as a soft tissue buffer between the rotator cuff and the bony surface of the acromion. The coracoacromial arch may be described as an accessory joint that is lined with the synovial membrane of the synovial bursa.8
- **Dysfunction and injury:** The greater tubercle of the head of the humerus may impinge or compress the supraspinatus and infraspinatus tendons, the joint capsule, the bicipital tendon, or the subdeltoid bursa against the coracoacromial ligament and anterior acromion. This is called impingement syndrome. The causes of this syndrome are diverse but include postural causes such as thoracic kyphosis or a habitual rounded-shoulder FHP. It may also be caused by muscle weakness from the scapular stabilizers or the rotator cuff muscles and the long head of the biceps, which provide a downward force on the humerus.
- **Treatment implications:** The first intention is to correct the client’s posture, if indicated. Next, use CR MET to facilitate and strengthen the external rotators. Then perform transverse massage on the coracoacromial arch to reduce any adhesions and scar tissue in the coracoacromial ligament and to correct any positional dysfunction in the deltoid and rotator cuff muscles.

**BURSAE**

- **Structure:** A bursa is a synovial-lined sac filled with synovial fluid
- **Function:** The function of a bursa is to secrete a lubricant to neighboring structures, which decreases friction.
- Of the eight or nine bursae that are about the shoulder, only the subacromial bursa is commonly
involved clinically, and two others are occasionally involved.

- The **subacromial** or **subdeltoid bursa** lies over the greater tubercle of the humerus and supraspinatus tendon and under the coracoacromial ligament, acromion, and deltoid muscle (Fig. 6-6).
- The **subscapular bursa** lies over the anterior joint capsule and under the subscapularis muscle attachment to the lesser tubercle of the humerus.
- The **subcoracoid bursa** lies between the coracoid process and the clavicle.

**Dysfunction and injury:** The subacromial bursa can become inflamed due to overuse, postural stresses, or trauma and can become impinged under the acromial arch. Because of its closeness to the supraspinatus tendon, any scarring or calcium deposits in the body of the tendon can irritate this bursa. It is also susceptible to irritation from a type III acromion, also called a hooked acromion. This type of acromion has a bony protuberance on the undersurface, which can irritate the supraspinatus tendon that travels underneath it.

- The subscapular bursa can become irritated because of increased tension in the pectoralis minor and subscapularis muscles.
- The subcoracoid bursa can become irritated because of the forward tipping of the scapula caused by pectoralis minor hypertonicity.

**Treatment implications:** Lauren Berry, RPT, taught that the bursae can be manually drained if they are swollen. They can also be manually pumped to increase their synovial fluids if they are dried out because of adhesions. These techniques are clinically effective for both conditions.

**CAUTION:** When treating an acute bursitis, be extremely gentle, or you may aggravate the condition.

**NERVES OF THE SHOULDER REGION**

- Most of the nerve supply of the shoulder and arm arise from the **brachial plexus**, which begins as five nerve roots from C5 to C8 and T1 (Fig. 6-7). As was
The brachial plexus then travels over the first rib and under the clavicle and subclavius muscle. This costoclavicular space can be compromised because of previous trauma, such as a fractured clavicle, or because of postural imbalances, such as rounded shoulders.

The nerves then travel between the pectoralis minor and the rib cage, medial to the coracoid process. At the level of the pectoralis minor, the brachial plexus forms the medial, lateral, and posterior cords. Distal to the pectoralis minor, the three cords divide into many branches, including the radial, median, and ulnar nerves that travel into the arm and down to the hand.

The medial and ulnar nerves travel along the medial arm in the medial bicipital groove, bounded by the biceps and triceps. The radial nerve leaves this groove at the margin of the proximal and middle third of the arm and travels to the posterior surface of the humerus in the radial groove.

In addition to the brachial plexus, there are several peripheral nerves in the shoulder region that we address in the treatment section of this chapter: The long thoracic nerve travels on the thoracic wall over the serratus anterior; the subscapular and thoracodorsal nerves lie on the subscapularis muscle; the suprascapular nerve travels through the supraspinatus notch of the scapula and supplies the supraspinatus and infraspinatus; the axillary nerve travels over the posterior and inferior aspect of the posterior joint capsule to supply the deltoid and teres minor; and the radial nerve (see above). These nerves can become entrapped because of shortened fascia or sustained contraction in the muscles.

**Dysfunction and injury:** As was mentioned in Chapter 5, “Cervical Spine,” these nerve roots travel through the anterior and the middle scalenes. The roots of the brachial plexus unite just above the clavicle to form the superior middle, and inferior trunks. The middle part of the clavicle is convex anteriorly, and the axillary artery and vein and brachial plexus pass posterior to this.

- The brachial plexus can become compressed at several different sites:
  - Between the anterior and middle scalenes.
  - Between the clavicle and the first rib, called **costoclavicular syndrome.** This syndrome is caused by rounded-shoulder posture; thoracic kyphosis; or previous trauma to the clavicle, AC joint, or glenohumeral joint.

 Clinically, the brachial plexus can become compressed for several reasons:

- Between the anterior and middle scalenes.

**Treatment implications:** Four distinct areas must be released when the therapist considers peripheral entrapment of the brachial plexus: the region of the scalenes, the supraclavicular space, the infraclavicular space, and the pectoralis minor. Refer to Chapter 5 for further discussion of the scalenes.

Begin with instruction in postural awareness. Next, perform CR MET to reduce the hypertonicity in the tight muscles. Then use PIR MET to lengthen the short anterior muscles and fascia, and use CR MET and home exercises to strengthen the weak lower trapezius. Treat the pectoralis minor, pectoralis major, and subscapularis first. Aft facilitated the lower trapezius, perform manual release on the supraclavicular and infraclavicular spaces.

**MUSCLES OF THE SHOULDER REGION**

- **Structure:** The muscles of the shoulder region may be divided into **two major groups:** muscles that stabilize the scapula and muscles of the rotator cuff.

- **Four main muscles stabilize the scapula:** the rhomboids, trapezius, levator scapula, and serratus anterior (Figs. 6-8 and 6-9). To perform elevation of the arm, these muscles must contract first to stabilize the scapula against the rib cage. Then the rotator cuff muscles and the deltoids contract to elevate the arm.
The **four muscles of the rotator cuff** are the supraspinatus, infraspinatus, teres minor (Fig. 6-10), and subscapularis (see Fig. 6-9). They attach to the posterior, superior, and anterior head of the humerus as a continuous cuff, not as discrete tendons. The fibers of the cuff blend with the articular joint capsule.

**Function:** The chief function of the rotator cuff muscles is dynamic stabilization of the glenohumeral joint. In most joints, the close fit of the articulating bones, the ligaments, and joint capsule offers primary stability. As has been mentioned, there is little congruence between the humeral head and the glenoid fossa. When the arm hangs at the side, little contraction of the deltoid or cuff muscles is required, as the superior joint capsule and the coracohumeral ligament provide a reactive tensile force that pulls the humeral head against the glenoid cavity. When the arm is elevated, the superior joint capsule is lax and no longer stabilizes the joint, so the muscles of the rotator cuff must hold the humerus in proper orientation to the glenoid, playing an essential role in stabilizing the joint. They create joint compression and downward depression, creating a fixed fulcrum so that the deltoid can rotate the arm upward. If the cuff muscles are weak, the contraction of the deltoid causes an abnormal upward movement of the humeral head, causing an impingement of the soft tissue into the coracoacromial arch.

**Dysfunction and injury:** The rotator cuff is a common site of acute injuries, degenerative conditions, and acute injuries that are the end stage of chronic degeneration caused by cumulative stresses. Rotator cuff injuries may vary from mild irritation and partial strains (tears) to full thickness tears. The most commonly affected muscle is the supraspinatus. The supraspinatus should receive its primary blood supply from the thoracoacromial artery. This
artery is frequently absent, leaving the tendon hypovascular.\textsuperscript{6} The infraspinatus may also be hypovascular but to a much lesser extent. This decreased blood supply makes the area susceptible to fatigue and degeneration.

Two common conditions decrease the stability of the joint:

- Thoracic kyphosis, which causes the tension in the superior joint capsule to be lost, and the rotator cuff muscles must maintain constant contraction to stabilize the arm, making it susceptible to fatigue and degeneration.\textsuperscript{6}
- Weakness in the scapular stabilizing muscles, especially the serratus anterior and the lower and middle trapezius. This allows the acromion to migrate forward, into a position of greater impingement.

As was mentioned previously, according to Janda,\textsuperscript{10} there are predictable patterns of muscle dysfunction. In the upper body, he describes this as the \textit{upper crossed syndrome}.\textsuperscript{10} Below are listed the muscles of the shoulder girdle complex that are typically imbalanced and participate in the upper crossed syndrome.

\textbf{Muscle Imbalances of the Shoulder Region}

- \textbf{Muscles that tend to be tight and short}: Pectoralis major and minor, upper trapezius, subscapularis, sternocleidomastoid muscle, serratus anterior, external abdominal oblique, deltoid, teres minor, infraspinatus, subscapularis, latissimus dorsi, pectoralis minor, trapezius, middle scalene.
and levator scapula. Overdevelopment of the pectoralis and the subscapularis result in a protracted scapula and a stretch weakness of the rhomboids and middle trapezius.11

Muscles that tend to be inhibited and weak: Lower and middle parts of the trapezius, rhomboids, and serratus anterior, supraspinatus, infraspinatus, and teres minor. Weakness in the scapular stabilizing muscles allows lateral sliding of the scapula and results in anterior motion of the humeral head during abduction and external rotation, stressing the anterior joint and contributing to impingement.

POSITIONAL DYSFUNCTION OF SHOULDER REGION MUSCLES

- In dysfunction, the shoulder internally rotates and adducts. The humeral head migrates superiorly, leading to impingement. This internally rotated position can cause the bicipital tendon to track abnormally against the medial side of the intertubercular groove, irritating it.11
- The anterior and posterior deltoid, infraspinatus, and teres minor tend to drop into an inferior torsion.

Treatment implications: To treat muscular dysfunction, it is important to treat the short and tight muscles first, as they have an inhibiting effect on their antagonists. Regarding the positional dysfunction, Lauren Berry, RPT, theorized that the humeral head migrates upward after an injury or cumulative stress to the rotator cuff muscles and that the anterior and posterior deltoid and the rotator cuff muscles tend to roll into an inferior torsion, parting the midline. The treatment implication is that the humerus must be mobilized inferiorly and the anterior and posterior muscles about the head of the humerus must be lifted superiorly. As has been mentioned, it is important to assign home exercises to strengthen the external rotators and thus help depress the humerus. It is also important to strengthen the scapular stabilizers, especially the lower trapezius and the serratus anterior.

SHOULDER MUSCLE ANATOMY

See Table 6-1.

MUSCULAR ACTIONS OF THE SHOULDER

See Table 6-2.

MUSCULAR ACTIONS OF THE SHOULDER GIRDLE

See Table 6-3.
### Table 6-1 Anatomy of the Muscles of the Shoulder

#### Scapular Stabilizing Muscles (see Fig. 6-8)

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
<th>Action</th>
<th>Dysfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trapezius</td>
<td>Medial one-third of superior nuchal line, spinous processes of C7 and all thoracic vertebrae.</td>
<td>Spine and acromion processes of scapula and lateral third of clavicle.</td>
<td>The upper fibers elevate the scapula, the lower fibers depress it, and the middle fibers retract the scapula and have an essential role in stabilizing the scapula.</td>
<td>The upper fibers tend to be tight and short, while the lower fibers tend to be weak and long, allowing the scapula to migrate headward, decreasing stability of the scapula for movement of the arm.</td>
</tr>
<tr>
<td>Rhomboid Minor</td>
<td>Spinous processes of C7 and T1</td>
<td>Vertebral border of the scapula, superior to spine of scapula.</td>
<td>Both major and minor draw the scapula upward and medially; holds the scapula to the trunk along with the serratus anterior muscle; retracts the scapula along with the fibers of the middle trapezius.</td>
<td>Rhomboids tend to be weak, which contributes to a rounded shoulders posture.</td>
</tr>
<tr>
<td>Rhomboid Minor</td>
<td>Spinous processes of T2, 3, 4, 5</td>
<td>Vertebral border of the scapula below the spine of the scapula</td>
<td>Pulls the scapula upward and medially (along with the trapezius); if the scapula is fixed pulls the neck laterally; acts similar to the deep fibers of the erector spinae in helping to prevent forward shear of the cervical spine. Levator acts like a posterior “guy wire” holding up and stabilizing the head and neck along with the scalenes, the anterior “guy wires.”</td>
<td>Tends to be short and tight, contributing to rounded shoulders, but is in an eccentric contraction in the forward-head posture (FHP). As levator is active maintaining optimal head and neck posture, FHP will eccentrically load levator.</td>
</tr>
<tr>
<td>Levator Scapula</td>
<td>Posterior tubercles of the transverse processes of C1, 2, 3, 4. This attachment site is significant as there are four major muscles that blend into each other at this point: the splenius cervicis, posterior scalene, longissimus capitis, and the levator.</td>
<td>Superior angle of the scapula and to the base of the spine of the scapula</td>
<td>Pulls the scapula upward and medially (along with the trapezius); if the scapula is fixed pulls the neck laterally; acts similar to the deep fibers of the erector spinae in helping to prevent forward shear of the cervical spine. Levator acts like a posterior “guy wire” holding up and stabilizing the head and neck along with the scalenes, the anterior “guy wires.”</td>
<td>Tends to be short and tight, contributing to rounded shoulders, but is in an eccentric contraction in the forward-head posture (FHP). As levator is active maintaining optimal head and neck posture, FHP will eccentrically load levator.</td>
</tr>
<tr>
<td>Serratus Anterior</td>
<td>Surface of the upper nine ribs at the side of the chest, and the intercostal muscles in between.</td>
<td>Costal aspect of the whole length of the medial border of the scapula.</td>
<td>It is a major stabilizer of the scapula, holding the scapula against the rib cage. It performs abduction (protraction), i.e., draws the medial border of the scapula away from the vertebrae. Also provides upward rotation. The longer, lower fibers tend to draw the inferior angle of the scapula farther from the vertebrae, thus rotating the scapula upward slightly. It is the antagonist of the rhomboids.</td>
<td>The serratus tends to be weak, demonstrated by winging of the scapula during the scapular stabilization (push-up) test. Weakness of the serratus leads to instability of the scapula, contributing to impingement, and impairs the ability to lift the arm overhead with strength.</td>
</tr>
</tbody>
</table>

(continued)
Table 6-1  Anatomy of the Muscles of the Shoulder (Continued)

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
<th>Action</th>
<th>Dysfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supraspinatus (See Fig. 6-10)</td>
<td>Supraspinous fossa of the scapula.</td>
<td>Superior facet of the greater tubercle of the humerus.</td>
<td>Initiates abduction by compressing the head of the humerus into the glenoid fossa, stabilizing the humerus, so that the deltoid can rotate the arm upward.</td>
<td>The most commonly injured muscle of the shoulder. It is predisposed to degeneration due to hypovascularity. This contributes to a poor repair after an injury, and also predisposes it to fatigue that develops from sustained contraction. This sustained contraction develops from an altered position in the glenohumeral joint from rounded-shoulder posture, or thoracic kyphosis. Tends to be weak, which prevents humeral head from being seated properly in the glenoid fossa during arm movements, leading to instability of the glenohumeral joint.</td>
</tr>
<tr>
<td>Infraspinatus</td>
<td>Lower margin of the spine of the scapula, infraspinatus fossa.</td>
<td>Middle facet of the greater tubercle of the humerus.</td>
<td>Lateral rotation; dynamic stabilizer of the glenohumeral joint by compressing and pulling the humeral head down during elevation of the arm. The infraspinatus is more active than the supraspinatus with the arm abducted 120-150°, which explains why it is commonly irritated with excessive overhead activities.</td>
<td>As with the supraspinatus, the infraspinatus has a diminished blood supply relative to the other muscles of the shoulder, and therefore is commonly involved clinically. The infraspinatus tends to be weak either due to irritation or injury, or due to inhibition from the short and tight subscapularis, which allows the humeral head to migrate superiorly, contributing to impingement syndrome.</td>
</tr>
<tr>
<td>Teres Minor</td>
<td>Lower portion of the infraspinatus fossa and lateral margin of the scapula.</td>
<td>Lower facet of the greater tubercle of the humerus.</td>
<td>Lateral rotation and adduction; dynamic stabilizer of the glenohumeral joint by compressing and pulling the humeral head down during elevation of the arm.</td>
<td>Tends to be weak, which allows the humeral head to migrate superiorly, contributing to impingement syndrome.</td>
</tr>
<tr>
<td>Subscapularis (See Fig. 6-9)</td>
<td>Entire anterior surface of the subscapular fossa.</td>
<td>The lesser tubercle of the humerus, and the joint capsule.</td>
<td>Medial rotation and adduction; dynamic stabilizer of the glenohumeral joint by compressing and pulling the humeral head down during elevation of the arm.</td>
<td>Tends to be short and tight, leading to a sustained adduction and medial rotation of the arm, and contributing to inhibition of the external rotators. Weakness contributes to anterior instability of the glenohumeral joint.</td>
</tr>
</tbody>
</table>
### Additional Muscles

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin and Insertion</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deltoid (see Fig. 6-9)</strong></td>
<td>Outer third of the clavicle, border of the acromion, and lower edge of the spine of the scapula. Divided into three parts, the anterior, middle, and posterior.</td>
<td>Deltoid tubercle on the lateral surface of the humerus. The deltopectoral cuff muscles to act as a force couple during elevation of the arm. The deltopectoral elevates the humerus, as the infraspinatus, teres minor, and subscapularis pull inward and down. As the origin of the deltopectoral is on the scapula, which rises during elevation of the arm, this provides an optimal length/tension relationship for the strongest muscle contraction throughout the range of motion. The anterior fibers provide flexion and medi rotation. The posterior fiber provide extension and lateral rotation. The middle fibers provide abduction. According to Lauren Berry, R.P.T, the fascicles of the deltopectoral roll into an abnormal anterior and inferior torsion with a rounded-shoulders posture. This posture tends to promote adduction and internal rotation of the humerus, contributing to this torsion.</td>
</tr>
<tr>
<td><strong>Biceps Brachii</strong></td>
<td>Short head from the coracoid process; long head from the supraglenoid tubercle above the glenoid cavity, and the superior labrum.</td>
<td>Radial tuberosity of the radius and bicipital aponeurosis, which is a broad sheet of fascia that blends with the deep fascia of the medial forearm. Primarily a flexor and supinator of the forearm. Long head is involved in abduction, the short head in adduction. The tendon of the long head is fixed, and the humerus moves relative to it. Also acts like a cuff muscle as a dynamic stabilizer of the humeral head during abduction, aiding in humeral depression. In fact, Cailliet states that the greatest downward glide of the humerus has been attributed to the mechanical force of the contracting long head of the biceps. Long head of the biceps in involved in impingement syndrome, along with supraspinatus. The detachment of the superior labrum-biceps complex is described as a SLAP lesion (superior-labral-anterior-posterior).²</td>
</tr>
<tr>
<td><strong>Triceps Brachii</strong> (See Fig. 6-8)</td>
<td>Three heads: long head from the tubercle below the glenoid; lateral head from the lateral posterosuperior shaft of the humerus; and medial head from the posterior shaft of the humerus.</td>
<td>Olecranon process of the ulna at the elbow. Primarily an elbow extensor; also extends the arm and adducts it.</td>
</tr>
</tbody>
</table>
### Table 6-1  Anatomy of the Muscles of the Shoulder *(Continued)*

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
<th>Action</th>
<th>Dysfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teres Major</strong></td>
<td>Lower third and inferior angle of the lateral border of the scapula.</td>
<td>Inner lip of the intertubercular groove of the humerus, and blends with the anterior joint capsule.</td>
<td>Extension—draws the arm from the front horizontal position down to the side. Inward rotation—as it depresses, it rotates the humerus inward. Adduction—draws the arm from the side horizontal position down to the side and rotates inward as it adducts.</td>
<td>Teres major contributes to rounded shoulder posture by pulling scapula into abduction (protraction).</td>
</tr>
<tr>
<td><strong>Coracobrachialis</strong></td>
<td>Coracoid process of the scapula.</td>
<td>Medial surface of the humerus, in mid-shaft.</td>
<td>Flexes and adducts arm.</td>
<td></td>
</tr>
<tr>
<td><strong>Pectoralis Major</strong></td>
<td>Medial half of the anterior surface of the clavicle, anterior surface of the costal cartilages of the first six ribs, and adjoining portion of the sternum.</td>
<td>Flat tendon 2” or 3” wide to lateral lip of the intertubercular groove of the humerus, and blends with the anterior joint capsule.</td>
<td>Contraction of both the sternal and clavicular heads produces adduction and medial rotation. Clavicular heads is one of the prime flexors of the shoulder, along with the anterior deltoid.</td>
<td>Pectoralis major tends to be tight, rolling into inferior torsion with FHP and rounded shoulders.</td>
</tr>
<tr>
<td><strong>Pectoralis Minor</strong></td>
<td>3rd to the 5th ribs</td>
<td>Conoid process of the scapula.</td>
<td>Depression of shoulder girdle, so that the glenoid cavity faces more inferiorty; abduction and elevation of the scapula—draws the scapula forward and tends to tilt the lower border away from the ribs. Provides downward force on scapula to stabilize it against upward force, such as when using arms to get up from a chair.</td>
<td>Tends to be tight and short, leading to rounded-shoulder posture, creating an excessive load on the thoracic extensors, leading to thoracic pain. A short, tight pectoralis minor can also compress the brachial plexus against the rib cage, leading to pain, numbness and tingling down the arm, a type of thoracic outlet syndrome.</td>
</tr>
<tr>
<td><strong>Subclavius</strong></td>
<td>From the junction of bone and cartilage of the first rib</td>
<td>Into the sulcus for the subclavius muscle on the lower surface of the clavicle.</td>
<td>Pulls the clavicle toward the sternum and so stabilizes the sternoclavicular joint.</td>
<td></td>
</tr>
</tbody>
</table>
Table 6-2  Muscular Actions of the Shoulder

**Flexion**
- Deltoid (anterior)—also causes abduction and medial rotation
- Pectoralis major (clavicular part)—also causes horizontal flexion, adduction, and medial rotation; and the sternal portion of the pectoralis causes shoulder adduction, horizontal flexion, and medial rotation
- Biceps brachii—short head also assists in horizontal flexion and medial rotation; long head also assists in abduction; and biceps also flexes and supinates the elbow
- Coracobrachialis—also assists in adduction

**Adduction**
- Pectoralis major
- Latissimus dorsi
- Teres major
- Triceps brachii (long head)

**Extension**
- Teres major—also adducts and medially rotates
- Latissimus dorsi—also adducts and medially rotates
- Triceps (long head)—also adducts and extends the elbow
- Deltoid (posterior part)—also adducts and laterally rotates

**Abduction**
- Deltoid—middle and anterior
- Supraspinatus—may assist in lateral rotation
- Biceps brachii (long head)

The primary muscles of abduction are the middle and anterior deltoid and the supraspinatus. There is debate in the literature as to the function of the supraspinatus. It is easiest to test the supraspinatus at 15° abduction and the deltoid at 90° abduction.

**Horizontal Flexion (Horizontal Adduction)**
- Deltoid (anterior)
- Pectoralis major
- Coracobrachialis
- Biceps (short head)

**Horizontal Extension (Horizontal Abduction)**
- Deltoid (posterior)
- Triceps (long head)
- Latissimus dorsi
- Teres major

**Medial (internal) Rotation**
- Subscapularis—also adducts
- Pectoralis major
- Teres major
- Latissimus dorsi

**Lateral (external) Rotation**
- Infraspinatus—performs greater lateral rotation than the teres minor, deltoid (posterior), and supraspinatus combined
- Teres minor
- Deltoid (posterior)
- Supraspinatus

Table 6-3  Muscular Actions of the Scapula

**Elevation**
- Levator scapula—also laterally flexes the neck
- Trapezius (upper)
- Rhomboid major—also retracts the shoulder girdle and rotates the scapula downward
- Rhomboid minor—same as the rhomboid major

**Depression**
- Pectoralis minor—rotates the scapula downward and abducts it
- Serratus anterior (lower)
- Trapezius (lower)

**Protraction (Abduction)—Scapula Moves Away from Spine**
- Serratus anterior—also rotates the scapula upward
- Pectoralis major and minor

**Retraction (Adduction)—Scapula Moves Toward the Spine**
- Rhomboid major
- Rhomboid minor
- Trapezius (middle)

**Upward Rotation—The Lower Part of the Scapula Moves Away from the Spine, as in Lifting the Arm Overhead**
- Serratus anterior
- Trapezius (upper and lower)

**Downward Rotation—In the Anatomic Position the Scapula Is Almost to Maximum Downward Rotation**
- Levator scapula
- Rhomboid major
- Rhomboid minor
FACTORS PREDISPOSING TO SHOULDER PAIN

- Instability of the glenohumeral joint
- Weakness in the scapular stabilizing muscles
- Previous injury, including previous dislocation of the glenohumeral joint or separation of the AC joint
- Hypomobility of the cervical or thoracic spine, which limits full ROM of the glenohumeral joint
- Postural dysfunction, such as rounded shoulders, FHP, and thoracic kyphosis
- Muscle imbalances

DIFFERENTIATION OF SHOULDER PAIN

- Once you have ruled out pathology and pain from visceral diseases such as gallbladder irritation and cardiac problems (see the section “Contraindications to Massage Therapy: Red Flags” in Chapter 2, “Assessment and Technique”), shoulder pain that hurts at night or pain that increases at night indicates that there is an active inflammation. It may be caused by rotator cuff tendinitis, bursitis, capsulitis, or nerve root irritation, called cervical radiculitis (meaning “root inflammation”).

- Dysfunctions and injuries of the cervical facets and disc degeneration commonly refer to the interscapular region. Scapular motion rarely increases the pain, but active motion examination of the cervical spine reveals limited motion that may refer pain to the scapular region at the end ranges. As was mentioned in Chapter 5, “The Cervical Spine,” irritation of a sensory nerve root elicits sharp pain, numbing, and tingling in a specific area of skin called a dermatome. The cervical dermatomes include the shoulder region: C4, top of the shoulder; C5, upper arm and shoulder; and C6, elbow, and the radial side of the forearm and thumb. A myotome includes those muscles innervated by a specific motor nerve. Cervical nerves innervate the shoulder muscles. Irritation of the motor nerve elicits a deep aching in the corresponding muscle and a weakness in that muscle. The myotomes in the shoulder region are C4, shoulder elevation; C5, shoulder abduction; C6, elbow flexion and wrist extension; and C7, elbow and finger extension and wrist flexion. The shoulder is also a referral site from the fascia, ligaments, and joint capsules in the cervical spine that are innervated by the same segmental nerve. This is called sclerotomal pain and is described as deep, aching, and poorly localized.

- To help differentiate shoulder pain from pain that is being referred from the neck, there are certain guidelines:
  - Pain originating from the neck is often elicited or increased from neck motion.
  - Pain originating from the shoulder is typically elicited or increased from active shoulder motion and relieved by rest.
  - Isometric challenge of the muscles of the shoulder will be painful with a localized lesion in the shoulder.
  - Often, a painless weakness occurs in the arm and shoulder muscles that have a motor nerve root problem from the cervical spine.

- Rotator cuff injuries typically manifest as pain at the lateral portion of the upper arm, and a painful limitation when elevating the arm overhead. The involved muscles are identified by isometric testing.

- Bicipital tendinitis (long head) manifests as a well-localized pain at the anterior portion of the head of the humerus and aggravation with Speed’s test.

- Stiffness in the shoulder is typically adhesive capsulitis, which presents as a dramatic loss of arm motion, especially external rotation.

- Impingement manifests as pain over the anterior humerus, with a loss of internal rotation and a painful Neer’s impingement test.

- Instability manifests as clunking in the shoulder with active circumduction and excessive joint play in the passive motion test for the glenohumeral joint.

- Pain that originates in the glenohumeral joint is rarely felt at the joint, but over the lateral brachial region. This is explained by the concept of sclerotomal pain, because the tissue that is irritated is mainly the joint capsule and interweaving tendons of the rotator cuff, which are innervated by C5–C6 nerves; the lateral brachium is the C5 dermatome.
COMMON DYSFUNCTIONS AND INJURIES OF THE SHOULDER

ROTATOR CUFF TENDINITIS
(SUPRASPINATUS TENDINITIS)

Tendinitis of the rotator cuff most commonly involves the supraspinatus tendon and then the infraspinatus.

- **Cause:** Rotator cuff tears are described as partial- or full-thickness tears. They are further categorized as acute tears due to trauma, or chronic tears, which are those that are degenerative and slowly tear over time. The supraspinatus is most commonly involved for many reasons. The supraspinatus tendon has a poor blood supply, and the demands of the muscle can overwhelm the nutritional supply. This ischemia, or low oxygen in the tissue, combined with mechanical stress leads to a breakdown of fibrils which leads to an inflammatory response with consequent scar tissue and potential calcium deposits. The supraspinatus is the only muscle of the rotator cuff that travels through a tunnel, which is formed by the head of the humerus below and the acromion above. Any swelling will compress the tendon because of the confines of the tunnel, compromising the blood supply. This lesion is common in swimmers, tennis players, and baseball pitchers as well as clients who have poor posture. In the rounded-shoulder posture, the supraspinatus is under constant tension, leading to fatigue and degeneration.

- **Symptoms:** Clients experience a generalized, dull, toothache-like pain that refers to the lateral aspect of the humerus and is often worse at night, with an inability to lay on that shoulder. Calcific tendinitis can cause a hot, burning pain.

- **Signs:** Tendinitis signs are limited, painful elevation; a painful arc, which can be sharp, during active abduction between 60° and 120°; painful resisted abduction at 15°; positive supraspinatus test (empty-can test); and weak external rotators. Palpation reveals tenderness over the supraspinatus tendon proximal to or at its insertion on the greater tuberosity of the humerus.

- **Lesion Sites:** Tendinitis lesions occur at the tenoperiosteal junction and the musculotendinous junction. The tenoperiosteal junction will have the above signs, whereas the musculotendinous lesion will have a painful resisted abduction but will not have a painful arc or impingement test.

- **Treatment:** For acute supraspinatus tendinitis perform Level I, second and third shoulder series, with emphasis on releasing the pectoralis minor and major and deltoid to open the area over the supraspinatus tendon. As you perform the strokes, palpate the tissues to assess for hypertonicity, and perform MET and wave mobilization as indicated. Perform CR and reciprocal inhibition (RI) MET for the supraspinatus (MET #9) with light pressure to assess the degree of irritability. Repeat MET with increasing pressure to engage more of the muscle if the technique remains within client’s comfort level. Finally, perform Level I, fourth series of STM strokes. Use very gentle touch and slow movements. For chronic conditions, first perform PIR MET #10 to lengthen the supraspinatus. Perform transverse friction massage (TFM), Level I, fourth series, at the myotendinous and tenoperiosteal junctions to dissolve adhesions if you palpate any fibrosis. Perform MET for the external rotators to help increase their strength (METs #4 and #5). Perform MET to stretch the posterior capsule and increase medial rotation (METs #4 shoulder, #5 thoracic). Clients need to participate in a strength and stabilization program for the rotator cuff and scapular stabilizers.

INFRASPINATUS TENDINITIS

- **Cause:** Infraspinatus tendinitis commonly occurs in musicians, carpenters, swimmers, tennis players, and others who perform activities that involve sustained abduction, external rotation, and overhead activities. The infraspinatus is more active than the supraspinatus with the arm abducted 120° to 150°, which explains why it is commonly irritated with repetitive overhead activities.

- **Symptoms:** Clients typically experience pain at the insertion over the posterior aspect of the greater tuberosity at the myotendinous junction or anywhere in the belly of the muscle.

- **Signs:** Pain on resisted lateral rotation.

- **Treatment:** For acute infraspinatus tendinitis, first perform CR and RI MET (METs #4 and #5) to reduce pain, swelling, and hypertonicity. Next, perform gentle STM (fifth and sixth series) to promote nutritional exchange and cellular synthesis. In chronic conditions, the infraspinatus tends to be weak and inhibited and has degenerative fibers rather than inflammation. First perform CR and PIR MET to the subscapularis and other medial rotators (MET #3) to ensure that they are not inhibiting the infraspinatus. Next, perform CR MET to strengthen the infraspinatus (METs #4 and #5). Finally, perform the fifth and sixth series of STM strokes to dissolve any fibrosis and to lift the fibers superior, as the fibers are typically in a sustained inferior torsion.
SUBSCAPULARIS TENDINITIS

- **Cause:** Causes of subscapularis tendinitis are activities involving repetitive or excessive internal rotation and adduction, as in carpentry, or cleaning or in throwing or racquet sports.
- **Symptoms:** Clients typically experience pain at the lesser tuberosity.
- **Signs:** Pain on resisted medial rotation is a sign of subscapularis tendinitis, as are painful arc, which is a lesion at upper site of the insertion point, and painful passive horizontal adduction, as it is pinched against the coracoid process.
- **Treatment:** For acute subscapularis tendinitis, first perform CR and RI MET (MET #3) to reduce pain, swelling and hypertoncity. Next, perform gentle STM (first series) to promote nutritional exchange and cellular synthesis. In chronic conditions, the subscapularis tends to be short and tight. First perform CR MET for the medial rotators (MET #3) to reduce hypertonicity in the subscapularis. Next, perform PIR MET to lengthen the subscapularis and other medial rotators (MET #11). Finally, perform the first series of STM strokes to dissolve an fibrosis.

ADHESIVE CAPSULITIS (FROZEN SHOULDER)

- **Cause:** Adhesive capsulitis begins as an inflammatory lesion of the anterior and inferior portion of the glenohumeral joint capsule that leads to a chronic, degenerative thickening and shortening of the tissue. There is no known cause. It affects women more than men and the middle-aged and elderly more than younger clients. Hertling and Kessler theorize that thoracic kyphosis and the consequent alteration in the scapulohumeral alignment is a predisposing factor.
- **Symptoms:** Adhesive capsulitis symptoms develop in three stages. The first stage is the initial freezing stage with an abrupt loss of motion and pain in the shoulder that refers pain to the lateral brachial region with movement. The second stage is the frozen stage, which may manifest as a persistent, dull ache, present at night or painful only with movement, and a dramatically reduced ability to elevate the arm. The pain may disturb the client’s sleep, especially when the client rolls onto that shoulder, and the pain may radiate to the elbow. The third stage, or thawing stage, usually manifests as a slow recovery of motion, which make take one to three years. Muscles of the rotator cuff and scapula stabilizers may atrophy.

IMPELLIGMENT SYNDROME

- **Cause:** Impingement syndrome is defined as a compromise of the space between the coracoacromial arch and the proximal humerus. The rotator cuff (usually the supraspinatus), subacromial bursa, and bicep tendon are compressed between the humeral head and the acromion or coracoacromial ligament. Impingement may be caused by an acute traumatic impingement from a fall on the shoulder or an outstretched hand. In chronic conditions, impingement syndrome has structural and functional causes. Structural causes include thickening of the rotator cuff tendons, inflamed bursa, and hooked acromion. Functional causes include rotator cuff weakness, scapular instability (weakness of scapular stabilizers), thoracic kyphosis, with either fibrosis and thickening of the posterior joint capsule or a lax capsule. Typically, the client presents with upper crossed syndrome, which includes tight pectoralis minor (which pulls the scapula into a protracted position), upper trapezius, levator scapula,
and internal rotators and weakness in the lower trapezius and external rotators. Neer describes three stages: an initial overuse syndrome; the development of thickening and fibrosis; and the development of bony changes, including spurs.

**Cause:** Instability may result from rotator cuff weakness; lack of scapular stabilization; or damage to the anterior capsule, glenohumeral ligament, and glenoid labrum. Instabilities are classified as traumatic, nontraumatic, and acquired. Traumatic instability usually involves a history of shoulder dislocation or rotator cuff injury, such as a fall on an outstretched hand. Nontraumatic causes involve rotator cuff weakness and lack of scapular stabilization. Acquired instability describes either congenital laxity in the ligaments or poor treatment outcome after a dislocation.

**Symptoms:** Clients usually experience a gradual onset of pain at the anterior acromion or greater tuberosity, but this pain may refer down the C5–C6 sclerotomes. It also may present as sharp twinges, especially with abduction.

**Signs:** Painful arc of abduction between 90° and 120° and a positive Neer’s impingement test. Internal rotation is the most restricted (opposite the typical capsular pattern), and elevation next, with only a slight loss of external rotation. The posterior capsule is typically thick and fibrotic.

**Treatment:** The primary goal of assessment is to determine whether the client has instability due to weakness in the rotator cuff and scapular stabilizers and a lax capsule, or rotator cuff thickening and a fibrotic posterior joint capsule. The typical treatment is to release the posterior capsule, and recruit (strengthen) the rotator cuff and scapular stabilizers. In the acute phase, perform CR MET to reduce the hypertonicity in the tight muscles and to recruit the weak or inhibited muscles that have been identified by palpation and isometric challenge. The goal is to reduce the swelling in the joint and balance the muscles that stabilize the joint. In chronic conditions, the goal of treatment depends on whether the region is deconditioned or thick and hypertonic. For deconditioned muscles and lax capsules, perform CR MET to help recruit the muscles, and refer your client to a physical therapist or personal trainer for strength and stabilization exercises. Emphasis needs to be placed on strengthening the posterior cuff muscles and scapular stabilizers, especially the scapular retractors. For hypertonic muscles and fibrosis in the posterior joint capsule first perform MET for the hypertonic muscles an Level I, sixth series, and Level II, third series, to release adhesions in the capsule. Perform MET to increase internal rotation (MET #4) and stretch the posterior capsule. Next, perform manual release of any fibrosis that was palpated in the cuff tendon and the coracoacromial ligament.

**INSTABILITY SYNDROME OF THE GLENOHUMERAL JOINT**

**Cause:** Instability typically involves sustained contraction in the pectoralis minor and subscapularis and weakness in the external rotators, pulling the humerus forward. First, use palpation and isometric testing to identify the tight and weak patterns of the shoulder. Perform CR MET on the tight muscles first—typically the pectoralis minor and subscapularis—to reduce the hypertonicity. Next, facilitate (strengthen) the external rotators with CR MET. Because the shoulder is too loose, it is important to work selectively on the tighter muscles rather than creating a generalized release in the shoulder region. The client needs exercise instruction to strengthen the rotator cuff muscles and scapular stabilizers.

**BICIPITAL TENDINITIS**

**Cause:** Bicipital tendinitis is usually the result of repetitive microtrauma as a result of overhead activities that involve flexion and internal rotation such as swimming, tennis, or throwing. As the long head attaches to the supraglenoid labrum, an acute or cumulative trauma to the biceps can tear the labrum.

**Symptoms:** Clients experience pain over the anterior aspect of the humerus at the bicipital groove (tenosynovitis) and at the superior labrum with insertional tendinitis of the long head.

**Signs:** Pain on resisted forward flexion of the shoulder with the elbow extended and the forearm supinated (Speed’s test) and pain on resisted supination.

**Treatment:** In the acute phase, perform CR MET to the biceps. This is accomplished by using the same position as Speed’s test. The intention is to reduce pain and swelling and decrease muscle spasms. If light pressure elicits pain, perform RI for the biceps...
by having the client resist as you attempt to elevate the arm. Perform Level I strokes to gently mobilize the soft tissue and joints. Perform the second series of Level II strokes with light pressure and a slow rhythm to help normalize the position of the tendon in the bicipital groove. In chronic bicipital tendinitis (tendinopathy), recent evidence indicates that instead of an inflammatory condition, the tissue is degenerated, with the collagen in disarray and poor blood supply compared with normal tissue.16 Our intention is to create a micro-inflammatory environment to induce revascularization and remodeling of the tissue. Repeat the treatment protocol described for acute conditions, but use greater pressure with the METs and greater depth with the strokes. The fourth series of Level I strokes and the second series of Level II strokes are emphasized to dissolve adhesions in the rotator cuff and bicipital attachments at the supraglenoid rim and to dissolve adhesions in the bicipital groove and on the bicipital tendon.

SUBACROMIAL (SUBDELTOID) BURSITIS

■ **Cause:** Excessive overhead activities can irritate the bursa, leading to an acute bursitis in which the bursa swells. This is a rare condition. Typically, the supraspinatus tendon is involved. Over time, calcific deposits from this tendon, which lies under the bursa, may irritate or even rupture the bursa.6

■ **Symptoms:** Clients experience the following symptoms with acute or chronic subacromial bursitis:
  - **Acute:** Pain can be excruciating, and the patient loses the ability to move the arm.
  - **Chronic:** Pain can be diffuse and achy over the proximal humerus and is often painful at night.

■ **Signs:** Acute and chronic subacromial bursitis signs are as follows:
  - **Acute:** All active ROM is painful. Heat and swelling may be palpable. Resisted abduction is painful. To passive motion testing, there is an empty end feel; that is, the client reports pain, but you do not feel the tension barrier in the tissue.
  - **Chronic:** A painful arc in the middle of active and passive abduction. Resisted movements are usually painful.

■ **Treatment:** For **acute** bursitis, perform manual draining of the bursa with Level II, fifth series, but use extreme caution. Students are always surprised at how gentle these strokes are. If the bursitis is **chronic,** assess the rotator cuff muscles. Often, an underlying tendinitis in the supraspinatus is found, and any fibrosis at the tenoperiosteal junction must be released (Level I, fourth series). You can perform the manual draining of the bursa with greater depth for a chronic bursitis, but always begin with light pressure.

ACROMIOCLAVICULAR LIGAMENT SPRAIN

■ **Cause:** AC ligament sprain is usually a traumatic event, such as a fall on an outstretched hand or a direct fall onto the shoulder.

■ **Symptoms:** Clients experience well-localized pain over the AC joint.

■ **Signs:** Pain at the AC joint from 90° to the end range of active abduction and pain at the AC joint on passive horizontal adduction.

■ **Treatment:** For **acute** conditions, perform Level I strokes to help normalize the soft tissue of the shoulder. Identify strength/weakness imbalances through palpation and MET, and use MET to reduce hypertonicity in the tight muscles and to strengthen weak muscles. Next, perform very gentle back and forth strokes on the AC ligament (Level II, first series). For **chronic** conditions, repeat the protocol described above but with greater depth, including transverse friction massage to the AC ligaments.

SUPRASCAPULAR NERVE ENTRAPMENT

■ **Symptoms:** Clients experience poorly localized pain at the posterolateral aspect of the shoulder. The pain may refer to the arm.

■ **Signs:** Weakness without pain to resisted tests of supraspinatus and infraspinatus, possible pain at the posterolateral aspect of the scapula with overpressure in passive adduction of the arm, and pain after application of digital pressure on the nerve in the suprascapular or the spinoglenoid notch.

■ **Treatment:** Perform Level I, fifth series, to release the suprascapular nerve.

COSTOCLAVICULAR SYNDROME (PART OF THORACIC OUTLET SYNDROME)

■ **Cause:** Costoclavicular syndrome is defined as a compromise of the space between the clavicle and the first rib. It may be caused by a rounded-shoulder posture or previous trauma to the clavicle, AC joint, or glenohumeral joint, which lead to fibrous adhesions in the costoclavicular space.
Symptoms: Clients experience a generalized pain, numbing, or tingling down the arm, especially to the ulnar border.

Signs: A positive elevated-arm stress test (see “Assessment” in Chapter 5).

Treatment: For acute conditions, perform Level I strokes to help normalize the soft tissue of the shoulder. Identify strength/weakness imbalances through palpation and MET, and use MET to reduce hypertonicity in the tight muscles and to strengthen weak muscles. Next, perform cervical spine Level I, third series (Chapter 5). For chronic conditions, repeat the protocol for acute conditions with greater depth, and perform back and forth and transverse friction strokes for the costoclavicular space, Level II, first series. It is important to instruct the client in good posture and provide exercises to strengthen the weak muscles and lengthen the tight muscles. If you are not fluent in exercise rehabilitation, refer your client to a physical therapist or personal trainer.

PECTORALIS MINOR SYNDROME (PART OF THORACIC OUTLET SYNDROME)

Cause: Pectoralis minor syndrome is caused by sustained contraction of the pectoralis minor, which causes forward depression of the coracoid process, narrowing the space between the pectoralis minor and the rib cage, compressing the brachial plexus. The client typically has rounded shoulders, FHP, and the muscle imbalances that are typical of upper crossed syndrome.

Symptoms: Clients experience generalized pain, numbing, or tingling down the arm, especially to the ulnar border.

Signs: Symptoms are elicited with the application of digital pressure over the pectoralis minor and with the elevated-arm stress test (see “Assessment” in Chapter 5).

Treatment: It is important to realize that a tight pectoralis minor is usually only one piece of a more global imbalance, described as upper crossed syndrome. For acute conditions, perform Level I strokes of the cervical spine and shoulder to help normalize the soft tissue of the entire neck and shoulder region. Identify strength/weakness imbalances through palpation and MET and use MET to reduce hypertonicity in the tight muscles and to strengthen weak muscles. Concentrate on the CR and RI for the pectoralis minor. For chronic conditions, repeat the protocol described for acute conditions. Perform PIR MET for the pectoralis minor to reduce the hypertonicity and to lengthen it. Remember that the STM for pectoralis minor is performed in a superior direction, as it rolls into a sustained inferior torsion in dysfunction.

HISTORY QUESTIONS SPECIFIC TO SHOULDER PAIN

Where is the pain? What is the quality of the pain?

- Strains of the rotator cuff usually produce a dull ache that worsens at night, referred to the anterior and lateral shoulder, in the area of the deltoid tuberosity. Shoulder pain from emotional stress or FHP manifests as a dull pain in the upper trapezius and levator muscles. Persistent gripping pain in the arm and elbow—even at rest and especially if there is also numbing and tingling in the hands—could be a nerve root irritation from the cervical spine. An acute onset of throbbing pain that worsens at night can indicate an acute bursitis. Pain with lying on the shoulder is often a rotator cuff tendinitis, adhesive capsulitis, or bursitis. Chronic, severe, gripping pain that worsens at night needs a referral to a doctor.

Is there a loss of motion in the arm?

- Rotator cuff injuries are most inhibited in abduction. Impingement syndrome is reproduced with active flexion with the arm in medial rotation. Adhesive capsulitis can present as a drastic loss of external rotation and abduction, with or without pain. Acute bursitis presents as a drastic loss of motion with pain, especially at night.
**OBSERVATION: CLIENT STANDING**

**ANTERIOR VIEW**

- Are the clavicles level? Is shoulder height even? The shoulder is often elevated in rotator cuff and frozen shoulder conditions. The shoulder or clavicle is normally lower on the dominant side. Look for redness, swelling, and atrophy.

- Notice if there is a smooth contour to the area of the lateral shoulder or if the clavicle lies superior to the acromion at the AC joint. This is called a **step deformity** and indicates a previous AC separation.

- Is there a **sulcus sign** (i.e., an indentation below the acromion) resulting from a flattening of the normally round deltoid? This indicates an instability of the glenohumeral joint, a weak deltoid muscle, or an inferior subluxation.

**POSTERIOR VIEW**

- Is there scapular winging? If the inferior angle (or angles) of the scapula juts away from the thoracic wall, there may be a loss of scapular stabilization. Winging of the scapula in the resting position of the arm may be caused by scoliosis. It may also result from muscular injury; inhibition (weakness) of the scapular stabilizers, which are tested below (see “Scapular Stabilization Test”); or a nerve injury.

**SIDEVIEW**

- Are there rounded shoulders and FHP?

**MOTION ASSESSMENT**

To assess active movements, always begin on the non-involved side to establish a benchmark of normal motion for that client. Observe the ROM on the involved side, and ask the client whether the motion is painful. There may be an arc of pain; that is, there is pain during one part of the movement and then the pain disappears while the client continues the motion. If the motion is painful, ask the client to describe the location and quality of the pain. If the client knows what the painful motions are, ask him or her to perform these motions last. Have the client perform active cervical motions to assess ROM and symmetry between the sides and to see whether cervical motion elicits pain in the shoulder.

**SCAPULAR STABILIZATION TEST**

- **Position:** Have the client stand at arm’s distance from the wall and place his or her hands on the wall at shoulder level, keeping the elbows straight. Stand behind the client (Fig. 6-11).

- **Action:** Ask the client to lean into the wall to perform a push-up against the wall.

- **Observation:** When the client is performing the push-up, the scapula should remain stable against the thoracic cage. The inferior angle of the scapula should not wing off of the thoracic cage, and the medial borders of the scapula should not move more than approximately 1 inch. Winging indicates a weak serratus anterior or an injury to the long thoracic nerve. Excessive movement of the scapula indicates weakness of scapular stabilizers, including the serratus anterior, middle trapezius, or rhomboids.

**ABDUCTION**

- **Position:** Client stands with his or her back to you (Fig. 6-12).

- **Action:** Instruct the client to rotate his or her arms externally by turning the palms out. Then have the client raise the arms, trying to touch the palms together overhead.

- **Observation:** Notice if the top of the shoulder hikes upward at the beginning of the motion. This hiking typically indicates that there is a tight and short upper trapezius and levator scapula and a weak lower trapezius, serratus anterior, and supraspinatus. This muscular imbalance predisposes to impingement syndrome. Also notice if the client needs to
move in the scapular plane, that is, approximately 30° of forward flexion. This position is assume with acute and chronic problems. An arc of pain indicates supraspinatus tendinitis, subacromial bursitis, calcific deposits, or an AC joint irritation. Abduction is the best motion to indicate a rotator cuff tear. It may be impossible to perform the motion beyond 90° if there is a significant tear, especially in the supraspinatus.

MEDIAL ROTATION
- **Position:** Client stands with his or her back to you (Fig. 6-13).

- **Action:** Beginning with the non-involved side, ask the client to reach the hand up the back and try to touch the scapula. Measure the vertebral level that the fingertips or thumb touches. If measuring with the thumb, have the client place the thumb in the “hitchhiking” position. Compare with the other side.

- **Observation:** It is normal to be able to reach to approximately T5–T10. The client might be able to reach the only greater trochanter or sacrum on one side. This motion elicits pain in the anterior shoulder with an impingement syndrome, as you are forcing the greater tuberosity against the coracoacromial ligament. If the movement is not painful, have the client attempt the “lift-off” test, lifting the hand off the back. This tests the strength of the subscapularis.

FLEXION WITH INTERNAL ROTATION (NEER’S IMPINGEMENT TEST)
- **Position:** Client faces you and medially rotates the arm so that the thumb faces posteriorly.

- **Action:** Ask the client to raise the involved arm up to the side of the head. The thumb now faces anteriorly. The therapist then puts overpressure on the elevated arm.

- **Observation:** The range is normally approximately 170° to 180°. With the arm medially rotated, the supraspinatus, which attaches to the greater tuberosity, needs to slide under the coracoacromial ligament. If there is irritation, swelling, or scarring of the tendon, it impinges against this ligament.

LATERAL ROTATION
- **Position:** Client faces you (Fig. 6-14).

- **Action:** There are two actions. Ask the client to clasp his or her hands behind the head, with elbows pulled as far back as possible. If this is difficult have the client place his or her arms at the sides, with the elbows at 90°, and laterally rotate the arms.

- **Observation:** The first motion allows for easy comparison of both sides. It combines elevation and external rotation, a position of function for daily activities, such as getting dressed. In the second motion, the normal range is approximately 75° to 90°. Compare both sides. Lateral rotation is the first motion to be lost in adhesive capsulitis.

HORIZONTAL FLEXION (ADDUCTION)
- **Position:** Client faces you.
Action: Client is instructed to elevate his or her arm to 90° and move the arm across the front of the body, attempting to place the hand on the opposite shoulder.

Observation: If there is pain at the top of the shoulder, it implicates the AC joint; pain at the posterior shoulder implicates the posterior -inferior capsule; anterior joint pain may be the anterior labrum, subcoracoid bursa, or subscapularis tendon. If there is anterior joint pain, differentiate bursitis from tendinitis by first performing the same movement passively, which would typically be painful with bursitis but not tendinitis. Isometrically challenge the subscapularis, which may be painful with tendinitis but not bursitis.

PASSIVE MOVEMENTS

Passive movements are performed for those movements that do not have full and pain-free active ROM. Note the range, pain, arc of pain, pain with overpressure, and end feel. The following passive shoulder movements are performed with the client sitting.

ABDUCTION

Position: Stand to one side of the client. Hold the lower scapula with your thumb and index finger with one hand and the distal forearm with your other hand (Fig. 6-15).

Action: Slowly abduct the client’s arm until the resistance barrier is met or until the arm is against the client’s head, and feel for when the scapula begins to move.

Observation: Normally, the range is approximately 170° to 180°. The scapula should not move until 90° of abduction. If there are adhesions of the joint capsule, anchoring the scapula to the humerus, the scapula begins moving before 90°. If there is no pain in passive abduction and active abduction was painful, it indicates a tendinitis of the rotator cuff, typically the supraspinatus. If there is pain in passive abduction before there is tissue tension, this is the “empty” end feel of bursitis, in this case, of the subacromial bursa.

LATERAL ROTATION

Position: Stand to one side of the client, and place one hand on the client’s elbow to stabilize it against the client’s body and the other hand on the client’s distal forearm, holding it.

Action: Slowly pull the forearm laterally, which laterally rotates the arm.

Observation: Lateral ROM is limited in adhesive capsulitis, as the anterior capsule has developed fibrotic adhesions. The end feel is thick and leathery. It might or might not be painful.

CIRCUMDUCTION

Position: Stand behind and to one side of the client. Place one hand on the top of the glenohumeral joint, and hold the distal forearm with the other hand (Fig. 6-16).

Action: Slowly draw the arm backward to begin a circumduction motion. Move the arm in a forward circle, like the “crawl” swimming motion.
Observation: Circumduction motion helps to differentiate joint, muscle, and ligament lesions. There will be a loose feel or clunking with joint instability. You will feel crepitus (grinding sounds) with calcific deposits or arthrosis. There is a thickened feel and limited range with capsular lesions. With muscle hypertonicity, fascicular torsion, and soft tissue misalignment, there is a “cogwheel” pattern (i.e., there are resistances and dips in an otherwise smooth motion). Over time, you can learn to feel the subtleties of resistance under your hand.

ISOMETRIC TESTS

The client should be able to provide strong resistance to the following tests. Note if the client has difficulty providing resistance. Ask whether the resisted action is painful. If it is painful, ask about the location and quality of pain. Remember that the shoulder and arm are common referral sites for neck problems. Painless weakness may be indicative of a nerve root problem. If the client remains weak after treatment, he or she needs a referral to a chiropractor or an osteopath. All of the following muscles are innervated by C5 and C6.

MIDDLE DELTOID

- **Position:** The client’s arm is placed at 90° of abduction, with the elbow flexed 90° (Fig. 6-17).
- **Action:** Instruct the client to resist as you press down on the elbow.
- **Observation:** Pain indicates irritation or injury in the middle deltoid.

(EMPTY-CAN TEST)

- **Position:** The client’s arm is abducted 90°, 30° forward flexion, and maximally internally rotated that is, with the thumb turned down (Fig. 6-18).
- **Action:** Ask the client to resist as you press down on the distal forearm.
- **Observation:** The empty-can test isolates the action to the supraspinatus and also challenges the labrum-biceps complex. Pain at the lateral and anterior shoulder indicates irritation, injury, or scarring of the supraspinatus tendon or the biceps–labrum complex.
RESISTED LATERAL ROTATION

- **Position:** The client’s arm is elevated 90° and internally rotated, with the elbow flexed to 90°. Place one hand on the client’s elbow to stabilize it and the other at the distal forearm (Fig. 6-19).
- **Action:** Instruct the client to resist as you press downward on the client’s distal forearm.
- **Observation:** The external rotators are typically weak. This weakness may be due to FHP, overuse, or prior injury. Pain at the posterior humerus indicates involvement of the infraspinatus and the teres minor. It is important to instruct the client in a strengthening program for the external rotators if they are weak. One possible home program for strengthening the external rotators is shown in MET #5. Patients are instructed to use a hand weight and lift it to about 70°. Repeat to fatigue. You determine how much weight to use by determining how much weight fatigues them with the tenth repetition. Perform three sets of ten.

LONG HEAD OF BICEPS (SPEED’S TEST)

- **Position:** The client’s arm is flexed 30° in the scapular plane, with the elbow extended and the forearm supinated (Fig. 6-20).
- **Action:** Ask the client to resist and you press down on the client’s distal forearm.
- **Observation:** Pain in the anterior humerus implicates the long head of the biceps.

ADDITIONAL TEST

MOTION PALPATION AND MOBILIZATION OF THE GLENOHUMERAL JOINT

- **Intention:** This test is performed to assess both motion restrictions of the humeral head in the glenoid and to assess excessive motion/instability (Fig. 6-21). The test is shown here for teaching purposes, but in the context of the treatment, it is typically performed after METs and Level I strokes.

Figure 6-19. Isometric test for lateral rotation.

Figure 6-20. Speed’s test for the long head of the biceps.

Figure 6-21. Motion palpation of the glenohumeral joint. This test is performed to assess both motion restrictions of the humeral head in the glenoid and to assess excessive motion/instability.
GUIDELINES TO APPLYING TECHNIQUES

A thorough discussion of treatment guidelines can be found on p. 86 in Chapter 2. In the method of treatment described in this text, we make two underlying assumptions. The first is that an injury or dysfunction in one structure causes compensations in the entire region of the injury, as well as in other areas of the body. A rotator cuff injury, for example, is not isolated to only the fibers of the rotator cuff but typically creates tightening of the pectoralis minor and upper chest muscles, tightening of the extensors of the cervical spine, and weakness of the scapular stabilizers. It is important for the therapist to refer to other chapters to learn the protocol for assessment and treatment in each area involved.

The second assumption is that an injury or dysfunction that localizes in one tissue affects many other tissues in the area. Rotator cuff injury, for example, typically involves not only the muscles of the rotator cuff, but also the ligaments and joints capsule of the shoulder, as well as the alignment and motion of the glenohumeral joint. It is important for the therapist to assess and treat the surrounding muscles, tendons, ligaments, and joints of the shoulder in addition to treating the rotator cuff muscles.

The treatments described in this text address all the structures of the region through three techniques: muscle energy technique (MET), soft tissue mobilization (STM), and joint mobilization. These techniques can be applied to every type of shoulder pain, but the “dose” of the technique varies greatly from slow movements and light pressures for acute conditions to stronger pressures and deeper-amplitude mobilizations for chronic problems. Each aspect of the treatment is also an assessment to determine pain, tenderness, hypertonicity, weakness, and hypomobility or hypermobility. We use the philosophy of treating what we find when we find it. Remember that the goal of treatment is to heal the body, mind, and emotions. Keep your hands soft, keep your touch nurturing, and work only within the comfortable limits of your client so that he or she can completely relax into the treatment.

THE INTENTIONS OF TREATMENT FOR ACUTE CONDITIONS ARE AS FOLLOWS

- To stimulate the movement of fluids to reduce edema, increase oxygenation and nutrition, and eliminate waste products.
- To maintain as much pain-free joint motion as possible to prevent adhesions and maintain the health of the cartilage, which is dependent on movement for its nutrition.
- To provide mechanical stimulation to help align healing fibers and stimulate cellular synthesis.
- To provide neurological input to minimize muscular inhibition and help maintain proprioceptive function.
THE INTENTIONS OF TREATMENT FOR CHRONIC CONDITIONS ARE AS FOLLOWS

- To dissolve adhesions and restore flexibility, length and alignment to the myofascia.
- To dissolve fibrosis in the ligaments and capsula tissues surrounding the joints.
- To rehydrate the cartilage, restore mobility and ROM to the joints.
- To eliminate hypertonicity in short, tight muscles; strengthen weakened muscles; and reestablish the normal firing pattern in dysfunctioning muscles.
- To restore neurological function by increasing sensory awareness and proprioception.

Clinical examples are described below under “Soft Tissue Mobilization.”

MUSCLE ENERGY TECHNIQUE

THERAPEUTIC GOALS OF MUSCLE ENERGY TECHNIQUE (MET)

A thorough discussion of the clinical application of MET can be found on p. 76. The MET techniques described below are organized into one section for teaching purposes. In the clinical setting, the METs and STM techniques are interspersed throughout the session. METs are used for assessment and treatment. A healthy muscle or group of muscles is strong and pain-free when isometrically challenged. MET will be painful if there is ischemia or inflammation in the muscles or their associated joints. The muscle will be weak and painless if the muscle is inhibited or the nerve is compromised. During treatment, MET is used as needed. For example, when you find a tight and tender pectoralis minor, use CR MET to reduce the hypertonicity and tenderness. If the pectoralis minor is painful while contracting, perform an RI MET, inducing a neurological relaxation. If the external rotators are weak and inhibited, first release the tight internal rotators, then use CR MET to recruit and strengthen the external rotators.

MET is very effective for an acute, painful shoulder, but the pressure that is applied must be very light so as not to induce pain. Gentle, pain-free contraction and relaxation of the shoulder flexors and extensor and related muscles provide a pumping action to reduce swelling, promote the flow of oxygen and nutrition, and eliminate waste products.

THE BASIC THERAPEUTIC INTENTIONS OF MET FOR ACUTE CONDITIONS ARE AS FOLLOWS

- Provide a gentle pumping action to reduce pain and swelling, promote oxygenation of the tissue, and remove waste products.
- Reduce muscle spasms.
- Provide neurological input to minimize muscular inhibition.

THE BASIC THERAPEUTIC INTENTIONS OF MET FOR CHRONIC CONDITIONS ARE AS FOLLOWS

- Decrease excessive muscle tension.
- Strengthen muscles.
- Lengthen connective tissue.
- Increase joint movement and increase lubrication to the joints.
- Restore neurological function.

The internal rotators are typically short and tight, and the external rotators are typically weak. We will first assess the ROM of internal and external rotation. Next, we will assess and treat the muscles that tend to be tight (described in the upper crossed syndrome of Janda). In the muscles of the shoulder in the upper crossed syndrome, we usually find the pectoralis major and minor and subscapularis (an internal rotator) short and tight. Next, we will assess and facilitate the muscles of the rotator cuff that tend to be weak: the supraspinatus, and the primary external rotators, the infraspinatus, and teres minor.

The MET section below shows techniques that are used for most clients. In acute conditions, use MET #4 to increase external rotation and MET #7 and #8 to release the hypertonicity in the pectoralis major and minor. PIR MET, which lengthens muscles and fascia, is contraindicated for acute conditions.

Remember that MET should not be painful. Mild discomfort as the client resists the pressure is normal if the area is irritated or inflamed. Refer to Chapters 5 for METs for the thoracic spine and the cervical spine.
ASSESSMENT OF MUSCLE LENGTH
OF GLENOHUMERAL JOINT AND
PASSIVE RANGE OF MOTION

1. Assessment of the Range of Motion of Lateral Rotation of the Glenohumeral Joint
   ■ Intention: For full external rotation, there must be normal length in the medial rotators—the pectoralis major, the latissimus, the teres major, and the subscapularis—and the anterior joint capsule (Fig. 6-22).
   ■ Position: Client is supine, with the knees flexed and the feet on the table and with the low back flat on the table. Client then rests the arm at shoulder level (90° abduction) and lowers the forearm toward the head of the table without lifting the low back off the table.
   ■ Observation: The normal ROM allows the forearm to lie flat on the table (9° of external rotation). This motion is drastically reduced in frozen shoulder and slightly reduced with shortness of the medial rotators.

2. Assessment of the Range of Motion of Medial Rotation of the Glenohumeral Joint
   ■ Intention: For full internal rotation, there must be normal length in the lateral rotators—teres minor, infraspinatus, and posterior deltoid—and the posterior joint capsule.
   ■ Position: Client is supine, with the knees flexed and the feet on the table and with the low back flat on the table. Client then rests the arm at shoulder level (90° abduction) and lowers the forearm into lateral rotation as far to the table as comfortable, without lifting the low back off the table.
   ■ Stabilization: Hold the head of the humerus down to prevent it from moving forward.

CONTRACT-RELAX AND POSTISOMETRIC RELAXATION TECHNIQUES

3. Contract-Relax and Postisometric Relaxation Muscle Energy Technique for the Medial Rotators of the Shoulder and to Increase External Rotation
   ■ Observation: The normal range of medial rotation is 70° (i.e., for the forearm to be 20° from the table). This motion may be reduced in impingement syndrome, bicipital tendinitis, supraspinatus tendinitis, and shortening of the posterior joint capsule.
   ■ Intention: The intention is to relax the medial rotators, to increase the strength of the medial rotators if they test weak, to increase their length if they were found short by the previous assessment, and to increase external rotation of the shoulder (Fig. 6-23).
   ■ Position: Client is supine, with the knees flexed and the feet on the table and with the low back flat on the table. Client then rests the arm at shoulder level (90° abduction) and lowers the forearm into lateral rotation as far to the table as comfortable, without lifting the low back off the table.
   ■ Stabilization: Hold the head of the humerus down to prevent it from moving forward. As the arm is being moved into lateral rotation, clients with a history of dislocation might feel apprehensive. It is critical that you prevent the humeral head from moving anteriorly while you place the arm in lateral rotation.
   ■ Action: To release the medial rotators, have the client resist as you attempt to press further...
lateral rotation for approximately 5 seconds on the distal forearm. Relax and repeat to reduce hypertonicity. To lengthen the muscle and to increase lateral rotation, move the arm into further lateral rotation, and have client resist again for 5 seconds. Repeat three to five times.

4. **Contract-Relax and Postisometric Relaxation Muscle Energy Technique of the Lateral Rotators of the Shoulder**

- **Intention:** The intention is to relax tight lateral rotators, to increase the strength of the lateral rotators if they test weak, to increase the length of these muscles if they were found short by the previous assessment, to stretch the posterior joint capsule, and to increase medial rotation of the shoulder (Fig. 6-24).

- **Position:** Client is supine, with the knees flexed and the feet on the table, and with the low back flat on the table. Client then rests the arm at shoulder level (90° abduction) and lowers the forearm into medial rotation as far to the table as comfortable, without lifting the low back off the table.

- **Stabilization:** Hold the head of the humerus down to prevent it from moving forward.

- **Action:** Have the client resist as you attempt to press into further medial rotation on the distal forearm for approximately 5 seconds. Relax and repeat to reduce hypertonicity. To lengthen the muscle, move the arm into further medial rotation and have the client resist again for 5 seconds. Repeat three to five times.

5. **Contract-Relax and Reciprocal Inhibition Muscle Energy Technique in the Side-Lying Position for the Lateral Rotators**

- **Intention:** The intention is to reduce the hypertonicity of the infraspinatus, teres minor, and teres major with the client in a position that allows for massage of the region after the MET (Fig. 6-25).

- **Position:** Client is in the side-lying position. Place the client’s arm on the side of the body with the elbow flexed to 90°. Place one hand on the client’s elbow to stabilize the arm and the other hand on the distal forearm.

- **Action:** Have the client resist as you press down on the distal forearm for 5 seconds. To engage the teres major, which is an internal rotator of the arm, have the client resist as you pull up on the distal forearm for 5 seconds. Repeat these two METs several times and throughout your session as needed.

6. **Contract-Relax Muscle Energy Technique for the Pectoralis Major**

- **Intention:** The intention is to reduce hypertonicity with CR MET if the pectoralis major palpates as tight (Fig. 6-26).

- **Position:** Client is supine with knees bent, feet on the table. Place the client’s arm in 90° of flexion

- **Action:** Hold the client’s distal forearm, and have the client resist as you attempt to pull the arm away from the body (abduction) for approximately 5 seconds. Have the client relax, and then repeat the
7. Postisometric Relaxation Muscle Energy Technique for the Pectoralis Major

**Intention:** The intention is to lengthen the pectoralis major using PIR MET (Fig. 6-27).

**Position:** Client is supine with the knees bent, feet on the table. To lengthen the upper fibers, place the client’s arm at 90° of abduction, and to lengthen the lower fibers, place the arm at 13° of abduction.

**Stabilization:** Place one hand on the opposite clavicle when working with the upper fibers; place one hand on the glenohumeral joint on the same side when working with the lower fibers.

**Action:** To lengthen the upper fibers, hold the client’s distal forearm, and slowly move the arm to its tension barrier. Have the client resist as you press the arm toward the floor. Repeat this series until the arm can hang over the side of the table at 90° abduction.

For the lower fibers, move the arm overhead at approximately 135° abduction to its tension barrier, and have the client resist as you press the arm toward the floor. Relax, move the arm to a new length, and repeat.

**CAUTION:** If the stretch of this muscle causes numbing and tingling, you are stretching the brachial plexus and need to perform CR technique without the stretch.

8. Contract-Relax and Postisometric Relaxation Muscle Energy Technique of the Pectoralis Minor

**Intention:** The intention is to relax and lengthen the pectoralis minor (Fig. 6-28).

**Position:** Client is supine with the knees bent and feet on the table. Place the palm of one hand over
the head of the humerus, and place the other hand under the posterior humerus. Lift the shoulder forward and medially, bringing the origin and insertion of the pectoralis minor toward each other.

**Action:** Have the client resist as you press on the head of the humerus, attempting to press it back to the table. Press for approximately 5 seconds, relax, and repeat. Move the head of the humerus closer to the table to lengthen the pectoralis minor, and have the client resist as you press toward the table again. Relax, and move the humerus as close to the table as is comfortable and have the client resist again. To reciprocally inhibit the pectoralis minor in its lengthened state, have the client resist as you attempt to lift the scapula off the table.

9. **Contract-Relax Muscle Energy Technique of the Supraspinatus**

**Intention:** The intention is to relax the supraspinatus.

**Position:** Client is supine, with arms at the sides. Bring one arm away from the client’s body approximately 6 inches, to approximately 15° abduction. Place one hand on the client’s distal forearm and the other hand on the belly of the supraspinatus in the supraspinous fossa of the scapula.

**Action:** Have the client resist as you press toward the client’s body. Press for 5 seconds, relax, and repeat. Tap on the belly of the muscle in the supraspinous fossa and say, “Feel this muscle working,” to bring sensory awareness to the muscle. The RI is to have the client resist as you attempt to pull the arm away from the body.

10. **Postisometric Relaxation Muscle Energy Technique for the Supraspinatus**

**Intention:** The intention is to lengthen the connective tissue of the supraspinatus and the superior portion of the joint capsule. This procedure is for **chronic conditions only** (Fig. 6-29).

**Position:** Client is sitting and places one hand on his or her low back. Hold one hand on the client’s distal forearm, and stabilize the client’s trunk with the other hand.

**Action:** Have the client resist as you attempt to pull the client’s arm toward you, across the back. Pull for 5 seconds. Relax for a few seconds, and while the client is completely relaxed, pull the arm slowly into a further stretch across the back. Repeat three to five times. This may also be done as a CRAC ME. After the relaxation, have the client actively reach across the back as you gently pull the arm across.

11. **Postisometric Relaxation Muscle Energy Technique to Increase Medial Rotation**

**Intention:** The intention is to increase medial (internal) rotation of the glenohumeral joint and to stretch the posterior capsule and subscapularis (Fig. 6-30).

**Position:** Client is sitting and places one hand on his or her low back. If this is difficult, the hand is placed on the sacroiliac joint or the greater trochanter area. Hold one hand on the client’s elbow and one hand on the distal forearm.

![Figure 6-29. PIR MET for the supraspinatus.](image-url)

![Figure 6-30. PIR MET to increase medial rotation.](image-url)
12. Muscle Energy Technique to Increase Inferior Glide of the Glenohumeral Joint

**Intention:** The intention is to reduce the hypertonicity of the muscles of the shoulder, to relieve pain, and to stretch the joint capsule (Fig. 6-31).

**Position:** Client is supine, with the involved arm at the side. Stand in the 45° headward position, tuck the client’s forearm against your body, and hold it there with your arm. Place one hand in the client’s axilla to stabilize the shoulder, and hold the distal humerus with your other hand.

**Action:** While the client is completely relaxed, press headward slightly with the stabilizing hand while you rotate your trunk away from the table, gently pulling the humerus inferiorly (toward the feet). Hold for 30 to 90 seconds.

**Alternate Method:** This MET movement is performed with the therapist sitting. Take your shoe off and place your foot in the client’s axilla and hold the distal forearm. Lean back to traction the client’s arm. Hold for 30 to 90 seconds.

### TREATMENT FOR LOSS OF SHOULDER MOTION

13. Contract-Relax Antagonist Contract to Increase External Rotation in Abduction

**Intention:** The intention is to increase the ROM and length of the internal rotators and anterior joint capsule. In chronic shoulder problems, clients lose the ability to abduct and externally rotate the shoulder fully. This technique is a comfortable way to correct these problems (Fig. 6-32).

**Position:** Client is supine, with the feet on the table and the low back against the table. Place a pillow under the arms if the arms cannot rest comfortably at the end of their tension barrier. Have the client interlace the fingertips and place the hands under the head. Face 45° headward, and place your palms on the client’s elbows.

**Action:** Have the client resist as you attempt to press the elbows toward the pillow or table for about 5 seconds. Relax, then have the client pull her elbows back toward the table to a new resistance barrier. Relax, and repeat the resist, relax, pull toward pillow/table cycle five times.

**Home exercise:** To increase the ROM of the shoulder, have the client perform the following exercise at home: The client should attempt to pull the
elbows into the pillow for 5 seconds, relax, and repeat five times.

14. Eccentric Muscle Energy Technique to Increase Shoulder Elevation

**CAUTION: This technique is not to be performed on geriatric clients.**

- **Intention:** The intention is to help dissolve adhesions in the anterior joint capsule, as elevation of the shoulder is one of the primary motions lost in frozen shoulder (Fig. 6-33).

- **Position:** Client is supine and elevates the arm to the comfortable limit. Hold the distal humerus, and place one hand on the forearm.

- **Action:** Have the client resist as you attempt to move the arm overhead with moderate pressure. Tell the client, “Let me win, and allow me to move your arm very slowly, as long as it is not painful.” Move the arm slowly to the pain-free limit for approximately 10 seconds. Relax, but hold the arm in its new range if it is not painful. Bring it back slightly if it is painful. Repeat three to five times and rest the arm. Repeat another three to five times.

- **Variations:** Eccentric MET movement can be performed at increasing degrees of abduction, up to approximately 80°.

**BACKGROUND**

A thorough discussion of the clinical application of STM can be found on p. 68. In the Hendrickson Method of manual therapy described in this text, the STM movements are called wave mobilization and are a combination of joint mobilization and STM performed in rhythmic oscillations with a frequency of 50 to 70 cycles per minute, except in performing brisk transverse friction massage (TFM) strokes, which can be two to four cycles per second. These mobilizations are presented in a specific sequence, which has been found to achieve the most efficient and effective results. This allows the therapist to “scan” the body to determine areas of tenderness, hypertonicity, and decreased mobility. It is important to “follow the recipe” until you have mastered this work. The techniques described below are divided into two sequences: Level 1 and Level II. Level I strokes are designed for every client, from acute injury to chronic degeneration, to enhance health and bring the body to optimum performance. Level II strokes are typically applied after Level I strokes and are designed for chronic conditions. Guidelines for treating acute and chronic conditions are listed below.

**GUIDELINES FOR THE THERAPIST**

**Acute**

The primary intention of treatment is to decrease pain and swelling as quickly as possible, maintain as much pain-free joint motion as possible, and induce relaxation. In this method of treatment, the soft tissue is compressed and decompressed in rhythmic cycles. This provides a pumping action that helps to promote fluid exchange, reducing swelling. The strokes that are applied to the client in acute pain need to be performed with a very gentle touch, a very slow rhythm, and small amplitude. There is no uniform “dose” or depth of treatment. The depth of treatment is based on the client’s level of pain. If the soft tissue does not begin to relax, use more METs to help reduce discomfort, swelling, and excessive muscle tension. As was mentioned previously, intersperse your STM work with MET. Remember that stretching is contraindicated in acute conditions.
Chronic exam findings in clients with chronic shoulder problems are FHP, rounded shoulders, short and tight pectoralis minor and major, and weakness in the external rotators, lower trapezius, and scapular stabilizers. The glenohumeral joint is typically hypomobile, with thick, fibrous ligaments and capsular tissues surrounding the joint. Some patients demonstrate the opposite: instability in the joints, weak, deconditioned muscles, and atrophy in the ligaments and capsular tissues. The primary goals of treatment depend on the patient. For patients who are hypomobile, the treatment goals are to reduce the hypertonicity of the muscles; promote mobility and extensibility in the connective tissue by dissolving the adhesions in the muscles, tendons, ligaments, and capsular tissues surrounding the joints; rehydrate the cartilage of the joint; reestablish normal joint play and ROM in the joints; and restore normal neurological function by stimulating the proprioceptors and reestablishing the normal firing patterns in the muscles. Patients who are unstable need exercise rehabilitation. Our treatments can support their stability by reducing tension in the tight muscles with STM and MET and strengthening weak muscles, reestablishing normal firing patterns and rehabilitating the proprioceptors with MET.

Clinical Example: Acute

Subjective: CS is a 64-year-old male health-care administrator who presented to my office complaining of acute left shoulder pain. He reported that the pain began upon awakening a few days previously, after an intense exercise class the previous day. He described the pain as an ache at the mid-arm that could be sharp with certain movements, especially reaching, and that he was unable to elevate the arm overhead.

Objective: Examination revealed active arm elevation limited to 70°, eliciting pain at the anterior portion of the proximal humerus. Active abduction was approximately 20°, at which point pain was elicited in the left mid-humerus region. External rotation was 50% of normal, with pain at the proximal humerus. Speed's test and the empty-can test were both positive, eliciting pain at the superior glenoid. Motion palpation revealed a limitation of posterior glide of the head of the humerus, indicating an anterior fixation of the humeral head. Palpation revealed tight and tender tissue in the area of the anterior humerus.

Assessment: Inflammation of the bicipital tendon (long head), and supraspinatus, with a fixation of the glenohumeral joint.

Treatment (Action): Treatment began with the Level I STM strokes. The subscapularis was tight and tender, which limited external rotation. CR MET was performed to reduce the hypertonicity in the internal rotators and allow more external rotation. In palpating the soft tissue of the second series of Level I strokes, very tight and tender pectoralis major and minor were noted. RI and CR MET were performed on both these muscles (METs #7 and #8). The third series of strokes were then performed to unwind the muscles of the anterior humerus. After unwinding the tissue, I returned to the third stroke of the second series and placed my thumb on the tendon of the long head of the biceps. I palpated that the tendon was riding on the medial rim of the bicipital groove. Next, I mobilized the tendon in an M–L direction to center it in the groove. I performed the fourth series of strokes for the supraspinatus. The tenoperiosteal junction was very tender. I performed CR MET for the supraspinatus (MET #9), to help reduce the inflammation and help increase the nutritional exchange. After the MET, the tissue was much less tender. I then performed gentle STM strokes on the supraspinatus. Next, I performed an A–P mobilization on the head of the humerus. After several oscillations, the head of the humerus had normal passive glide. I ended the session with some soft tissue therapy on the cervical spine. I asked the client to perform active ROM after the session, and elevation was 120°.

Plan: I recommended weekly visits for one month. CS returned to our office in a week and stated that he was feeling significantly less pain and had increased ROM. Elevation was approximately 140°. I repeated the treatment described above. There was much less tension in all of the muscles. CS returned to my office one week later, symptom-free, with full ROM and normal strength. I told him to call as needed for further treatments, and he was discharged from active care.
spine, including the tight upper trapezius, sternocleidomastoid, suboccipitals, and levator scapula. With chronic conditions, we use stronger pressure on the soft tissue and more vigorous mobilizations on the joints. In the Level II sequence, we add deeper soft tissue work as well as work on attachment points, using transverse friction strokes if we find fibrosis (thickening). As was mentioned in the “Acute” section above, intersperse your soft tissue work with METs.

Clinical Example: Chronic

Subjective: RM is a 53-year-old realtor who presented to my office complaining of intense pain and limited motion in the left shoulder. He reported that he was playing basketball with his son a couple of months prior to our visit and jammed his shoulder going for the ball. He immediately felt intense pain at the glenoid area. He went to an orthopedist, and X-rays and MRI were negative for fracture or frank tears of the rotator cuff. He was given anti-inflammatory medication, but his condition did not improve. At the time of our first visit, he described an intense pain at the top of the shoulder that was sharp with certain motions, a deep ache at night, and an inability to lift his arm overhead.

Objective: Examination revealed an elevation of the shoulder on the left side. Active ROM was limited to 90° in flexion, 6° in abduction, and only being able to reach to his back pocket when attempting internal rotation, which elicited pain at the superior glenoid. Passive motion was only slightly better. Isometric testing revealed pain at the superior glenoid with the empty-can test, with only very light pressure. His external rotators were very weak with a light challenge. His pectoralis minor was very tight and tender, and the head of the humerus was fixated anteriorly.

Assessment: Joint and muscle inflammation, especially the supraspinatus, and a fixation of the gleno-humeral joint.

Treatment: My first treatment goal was to reduce the pain and swelling. I had the patient lie on his back, and I performed METs #6, #8, and #9 for the pectoralis minor and major and gentle CR MET for the supraspinatus. After the series of METs, I passively oscillated the arm in very small arcs of internal-external rotation to induce relaxation and disperse the fluid in the joint. I next performed MET #3 to reduce the hypertonicity of the internal rotators. The muscles of the anterior chest began to relax and allow greater motion in the arm. I performed the first three series of Level I strokes to unwind the soft tissue of the anterior shoulder, concentrating on both the pectoralis minor and the supraspinatus. Because he had such limited motion, the circumduction mobilization of the gleno-humeral joint (MET #2 of the third series of strokes) was performed very slowly and in very small arcs in the beginning. As he became comfortable with the movement and his muscles began to relax, I pressed the head of the humerus more firmly into the joint and performed larger arcs of motion. I ended the session with an A–P mobilization at the head of the humerus. I had him test the ROM at the end of the session, and he was able to elevate the arm to 120° without pain. I showed him simple stretching exercises and one strengthening exercise for the external rotators.

Plan: I recommended a series of weekly visits for one month. I repeated the same basic treatment described above on the second visit. His pain level was reduced so significantly that I was able to begin to stretch the soft tissue of the anterior chest and shoulder and instruct him in exercises to strengthen the external rotators. On the third visit, I began the treatment with him sitting and performed PIR METs to lengthen the supraspinatus and increase internal rotation (METs #10, and #11). Then I had him lie supine and used METs to release and lengthen the pectoralis minor and major (METs #6, #7, and #8), and to increase elevation (MET #14). Because the tissue was much less tender to the touch, I penetrated deeper into the tissue with the STM. I used shorter, more brisk transverse friction strokes on the supraspinatus and anterior joint capsule (Level I STM, fourth series, and Level II, second series). At the fourth visit, he reported that he was completely pain-free, that he was sleeping well, and that his ROM was dramatically better. On examination, his elevation was 160° without pain, and internal rotation was to the T10 vertebrae. I recommended four additional treatments. We performed the same basic protocol described above. At the time of his last visit, he had only slight limitation in his ROM compared with the other side, and isometric testing was strong and pain free. He continued with his strengthening and stretching exercises.
Table 6-4 lists some essentials of treatment.

**LEVEL I: SHOULDER**

1. Release of Serratus Anterior and Subscapularis

   **Anatomy:** Subscapularis (Fig. 6-34), serratus anterior, long thoracic nerve, and median and ulnar nerves (see Fig. 6-7).

   **Dysfunction:** The typical position of dysfunction of the shoulder is a forward and internally rotated position. The subscapularis is typically short and tight. It holds the humerus in an adducted, internally rotated position. The serratus is typically weak in a head-forward, kyphotic posture. The long thoracic nerve lies over the serratus anterior, and the subscapular nerve lies over the subscapularis. These nerves may be entrapped in the overlying fascia.

   **Position**
   - **Therapist position (TP):** Standing, facing 45° headward or facing the table.
   - **Client position (CP):** Supine, with arm abducted and externally rotated to its comfortable limit. If this position is difficult or painful, keep the arm in the scapular plane without external rotation. As you work toward more external rotation, place a supporting pillow under the client’s arm.

   **Strokes**
   1. If the shoulder cannot reach 90° of external rotation, perform PIR MET to increase external rotation (see “Muscle Energy Technique” above).
   2. With the client’s arm abducted and externally rotated, use your fingertips to perform a series of short, scooping strokes on the lateral rib cage to release the serratus anterior and long thoracic nerve (Fig. 6-35). Perform the strokes both posteriorly and toward the axilla. Cover the entire lateral rib cage. The supporting hand rests on the lower rib cage, gently compresses the rib cage, and moves slightly in the same direction with each stroke.
   3. Using your superior hand to hold the client’s distal forearm, place the fingertips of your inferior hand on the anterior scapula, and perform short, scooping strokes in a headward direction on the subscapularis as you rock the client’s arm in a backstroke-type motion (Fig. 6-36).
   4. With the client’s arm in the abducted and externally rotated position, place the thumb of your superior hand on the anterior surface of the scapula, and perform short, scooping, headward strokes to release the subscapularis (Fig. 6-37). Grasp the...
entire scapula with your hand. Your fingertips are underneath, and your thumb is on the anterior surface. Gently squeeze with your hand as your thumb performs the stroke.

2. Rolling Soft Tissue of Anterior Shoulder Superiorly

- **Anatomy:** Pectoralis major and minor, rotator cuff muscles, joint capsule, anterior and middle deltoid, coracobrachialis, and biceps (long and short head) (Fig. 6-38).

- **Dysfunction:** With most dysfunctions, the pectoralis major and minor and the anterior deltoid tend to roll into an anterior, inferior, medially torsion as the humerus is held in an adducted and internally rotated position. This pattern is present with rounded-shoulder FHP; kyphotic thoracic spine; and anterior subluxations of the head of the humerus. The pectoralis minor is typically tight and can entrap the neurovascular bundle that travels under it. The long head of the biceps may become misaligned and rest against the medial rim of the bicipital groove, which can lead to bicipital tendinitis.

**Position**
- **TP:** Standing
- **CP:** Supine

**Strokes**
1. Hold the client’s distal forearm with your superior hand, and move his or her arm into small arcs of external rotation as you perform 1-inch, scooping strokes with the fingertips of your other hand on the upper part of the pectoralis major and minor and the anterior deltoid (Fig. 6-39). Sink into the tissue until you take it into tension, and then scoop the fibers headward in a rhythmic, oscillating fashion, coordinated with the movement of the arm. Change the angle of your strokes so that you are working perpendicular to the line of the fiber.

2. To reset the entire segment into an externally rotated position from the dysfunctional internally rotated position, perform a backstroke-type circular motion with the arm as you perform several additional strokes in this area. The arm is adducted slightly as the backstroke begins and is abducted and externally rotated as it finishes.

3. An alternative method to release both the superficial muscles and the deeper rotator cuff muscles and joint capsule, is to switch hands, and hold the deltoid muscle with your superior hand such that the shaft of your thumb is in line with the shaft of the humerus (Fig. 6-40). Hold the client’s arm with your inferior hand at 90° abduction, then lift it off the table slightly to bring the superficial tissue into slack. Perform a series of short, scooping strokes in a superior direction with your thumb as you rock the client’s arm in small arcs of external rotation. Imagine rolling the tissue around the bone, unwinding it. Cover the entire area of the anterior and superior glenohumeral joint.

4. The technique described above may also be used to mobilize the long head of the biceps in the bicipital groove. Place your thumb on the medial side of the bicipital tendon, and mobilize the tendon medially.
3. Unwinding the Soft Tissue and Mobilization of the Glenohumeral Joint

■ **Anatomy:** Superficially—the pectoralis major, anterior and middle deltoid, coracobrachialis, and biceps brachii (Fig. 6-41); deeply—the joint capsule (see Fig. 6-4).

■ **Dysfunction:** The position of dysfunction is for the humerus to sustain an internally rotated position. The soft tissue winds into an abnormal internal torsion, decreasing the normal lubricant between the fascicles. Eventually, the glenohumeral joint may develop adhesions and begin to dry out, losing full ROM, which leads to calcific deposits.

**Position**

■ **TP:** Standing. Place the client’s arm under your axilla. If the client’s shoulder is stiff, it may be more comfortable in your inferior axilla. Otherwise, the arm is better placed on your superior side. If the arm is too heavy, place a pillow under the elbow.

■ **CP:** Supine
Strokes

1. Hold the proximal humerus with both hands, and compress it slightly into the glenoid cavity to bring the superficial tissues into slack (Fig. 6-42). In this series of strokes, the entire surface of both hands is used to unwind the soft tissue of the anterior and middle humerus. Externally rotate the tissue around the bone. The thumbs of both hands lie next to each other and also perform short, scooping strokes. Cover the anterior and middle portions of the proximal humerus down to the deltoid tuberosity.

2. Mobilize the shoulder. Perform circumduction to help normalize the movement characteristics of the glenohumeral joint and to rehydrate the joint by stimulating the synovial microvilli. Hold the arm as described in the first stroke. Move the entire humerus in a superior direction and then posteriorly, inferiorly, anteriorly, and superiorly again. Repeat this motion either in slow, gentle, small-amplitude circles for acute conditions or in more vigorous, brisk, larger-amplitude circles for chronic conditions. If there is a loss of normal external rotation, you may externally rotate the humerus as you move it superiorly. This stroke is an assessment and a treatment. Perform this movement gently and in small circles if the client is hypermobile or unstable.
4. Release of the Supraspinatus

- **Anatomy**: Supraspinatus and coracoacromial ligament (Fig. 6-43).
- **Dysfunction**: The supraspinatus is the only muscle of the rotator cuff that travels through a tunnel and is therefore susceptible to loss of oxygen when inflamed; the swelling compresses the tissue and may leave a scar on the tendon. The tendon can impinge under the acromion when the arm is abducted or during flexion, especially when combined with internal rotation. The coracohumeral ligament blends with the superior joint capsule and the supraspinatus tendon.

**Position**
- **TP**: Standing
- **CP**: Supine

**Strokes**
1. Release the supraspinatus muscle belly and myotendinous junction using single-thumb or fingertip technique. Place the client’s flexed elbow on his or her chest so that the arm rests across the chest. With your inferior hand, grasp just above the client’s elbow, and gently impulse the arm headward and posteriorly in the scapular plane. At the same time, the thumb or fingertips of your superior hand perform 1-inch, scooping strokes in the A–P direction in the supraspinous fossa (Fig. 6-44). Reposition the thumb slightly, draw the arm back, and repeat a series of strokes covering the entire supraspinous fossa. If you find thick, fibrotic tissue, stroke back and forth in the A–P direction.

2. To locate the supraspinatus attachment on the greater tuberosity, first have your client rest their hand on the ASIS to internally rotate the humerus. The tendon is located just under the anterolateral aspect of the acromion on the anterior–superior portion of the greater tuberosity.

3. Using the thumb or fingertips of your superior hand, perform TFM strokes on the tenoperiosteal junction of the supraspinatus tendon (Fig. 6-45). The pressure of a TFM stroke is applied in both directions, transverse to the line of the fibers. Hold the client’s distal forearm, and rock the arm with each stroke. As the fingertips move forward, the arm moves forward; as the fingertips move back, the arm moves back. This may also be performed as a shearing stroke, with the fingers and arm moving in opposite directions. Palpate for a thickened feel to the tendon, as these strokes are used only as needed. The tendon is usually tender. Perform approximately six to ten strokes on the same spot,
and then move to another spot. Work for 3 to 4 minutes per session on the tendon. It often takes six to eight sessions to dissolve the fibrosis. To expose more of the tendon, horizontally adduct the humerus across the client’s chest.

5. Release of the Infraspinatus, Teres Minor and Major, and Supraspinatus

- **Anatomy:** Infraspinatus, supraspinatus, teres minor and major, and suprascapular nerve (Fig. 6-46).

- **Dysfunction:** These muscles tend to roll into an inferior torsion as the humeral head migrates superiorly in dysfunction. The external rotators are usually weak, losing their normal function, which is to depress the humerus during arm elevation. This inferior torsion is also created with slumping posture, kyphosis, and weak scapular stabilizers. The suprascapular nerve travels under the infraspinatus on top of the scapula. A site of potential injury to this nerve is under the lateral aspect of the spine of the scapula.

**Position**

- **TP:** Standing

- **CP:** Side-lying, with elbows flexed, arms and hand resting on each other. Place a pillow between the client’s arms to help support and stabilize the arms.

**Strokes**

There are three lines of strokes: on the superior aspect of the scapula inferior to the spine of the scapula, in the middle of the scapula, and on the inferior aspect of the scapula. These strokes should be across the bone, not into the bone.

1. To release the hypertonicity or to recruit an inhibited muscle on the posterior scapula, perform CR and RI MET with the client in the side-lying position (see Fig. 6-25, p. 270).

2. Using a double-thumb technique, begin at the superior portion of the scapula inferior to the spine of the scapula, and perform 1-inch, scooping strokes in a superior direction (Fig. 6-47). Begin the series of strokes at the vertebral border, and continue to the posterior humerus.

**Note:** The suprascapular nerve travels under the infraspinatus and lies on top of the scapula. It is most exposed inferior to the most lateral aspect of the spine of the scapula. A sharp radiating pain is elicited if the nerve is compressed. It can be released with gentle scooping strokes.

3. Begin a second and third line of strokes on the middle and inferior aspects of the scapula, continuing to the posterior humerus.

![Figure 6-46. Teres minor, infraspinatus, and supraspinatus.](image)
4. As an alternative method to release the supraspinatus, face 45° headward. Tuck your arm under the client’s arm, and place both hands on the supraspinous fossa of the scapula (Fig. 6-48). Using your fingertips, perform back and forth strokes in an A–P direction on the supraspinatus muscle. Move your arms and the client’s arm with each stroke. Cover the entire area of the supraspinous fossa.

6. **Prone Release of the Posterior Rotator Cuff and Posterior Deltoid**

   - **Anatomy:** Supraspinatus, infraspinatus, teres minor, and posterior deltoid (Fig. 6-49).
   - **Dysfunction:** As has been mentioned, the muscles of the posterior shoulder tend to roll into an inferior torsion and need to be moved superiorly. With a loss of the normal thoracic curve and a retracted scapula, the posterior cuff muscles shorten.

   - **Position**
     - TP: Standing
     - CP: Prone

   - **Strokes**
     1. Place both thumbs on the posterior aspect of the proximal humerus, and perform a series of gentle, scooping strokes, rolling the soft tissue fibers superiorly (Fig. 6-50). The intention is to unwind the...
tissue around the bone. This releases the adhesions that develop from sustained contraction and inferior torsion. Grasp the entire arm with your hands, and move all the soft tissue that wraps around the humerus with each stroke. Release the pressure at the end of each stroke, place your hands in a slightly new location, and perform another stroke. Cover the entire posterior humerus.

LEVEL II: SHOULDER

1. Release of the Clavicle and the Coracoid Process Attachments

- **Anatomy:** Pectoralis major and minor, anterior deltoid, subclavius, and coracobrachialis; and coracoacromial, coracoacromial, coracoclavicular, and AC ligaments (Figs. 6-51A and 6-51B).

- **Dysfunction:** Thoracic outlet syndrome can be caused by a thickening in the fascia and a shortening of the musculature in the areas above and below the clavicle. Causes include rounded-shoulder FHP or previous injury, such as a fall on an outstretched hand. The ligaments attaching to the coracoid process are often fibrotic because of FHP, rounded shoulders, or impingement syndrome.

**Position**

- **TP:** Standing, facing the direction of your stroke
- **CP:** Supine

**Strokes**

1. Press the base of your superior hand under the clavicle as you wrap your fingertips over the sternum or clavicle (Fig. 6-52). Perform a series of short, back-and-forth strokes in the medial to lateral plane. Rock your body with your strokes. This technique cleans the superior and posterior portions of the medial clavicle and sternum for the sternocleidomastoid and superficial and deep cervical and pectoral fascia. Place your other hand on the lower rib cage. Press posteriorly and superiorly on the lower rib cage with your strokes to give some slack to the area being worked. Alternatively,
you can hold the client’s distal forearm and move the arm into small arcs of abduction and adduction with your strokes to help mobilize the clavicle.

2. Perform short, back-and-forth strokes in the medial-to-lateral plane with your thumb on the anterior and inferior clavicle. This technique releases the clavicular portion of the pectoralis major, the anterior deltoid, and the subclavius on the inferior portion of the clavicle.

3. Using the thumb of your superior hand, perform back-and-forth strokes on the inferior border of the coracoid process to release the pectoralis minor, coracobrachialis, and short head of the biceps (Fig. 6-53). Hold the client’s distal forearm to abduct the arm, and elevate it slightly to bring the tissue into slack.

4. Holding the client’s arm as in the previous stroke, perform transverse strokes with the thumb or fingertips beginning on the superior portion of the coracoid process for the coracoclavicular and coracoacromial ligaments and continuing your strokes to the clavicle and acromion. Move your fingertips to the AC joint and perform back-and-forth strokes in the A–P plane for the AC ligament. Rock the client’s arm in the direction of your stroke, and coordinate the movement of the arm with the stroke.

2. Release of the Joint Capsule and Muscle Attachments on the Anterior Humerus

**Anatomy:** Subscapularis, long head of the biceps in the bicipital groove, pectoralis major, teres major, latissimus dorsi, transverse humeral ligament, coracohumeral ligament, and joint capsule (Fig. 6-54).

**Dysfunction:** The muscles attaching to the anterior humerus are usually short and tight, pulling the arm into an adducted and internally rotated position. The tenoperiosteal and myotendinous junctions become fibrotic from the cumulative stress of poor posture, previous inflammation caused by overuse, or injury. The long head of the biceps is irritated with an internally rotated humerus because it forces the tendon to rub against the medial aspect of the groove. The anterior joint capsule is often thick and fibrotic after injury or cumulative stress and may develop adhesive capsulitis.

**Position**

- **TP:** Standing
- **CP:** Supine

**Strokes**

1. Facing 45° headward, use a single-thumb technique to release the transverse humeral ligament by moving in the inferior-to-superior (I–S) plane on both sides of the bicipital groove (Fig. 6-55). Rock the client’s arm as you rock your entire body with each stroke. Let your hand and thumb stay relaxed, and let the thumb move with the arm motion. Next, release any adhesions to the bicipital tendon by keeping your thumb on the bicipital tendon and moving the client’s arm into small arcs of medial and lateral rotation, letting the tendon roll under your thumb.

2. With the client’s arm at his or her side and the elbow flexed to 90°, place your thumb or fingertips to the most medial part of the lesser tuberosity. You can palpate the subscapularis by having your client

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**Figure 6-53.** Thumb release of the inferior border of the coracoid process.

**Figure 6-54.** Attachments to the anterior shoulder complex.
resist as you attempt to pull laterally on the distal forearm. Perform a series of back-and-forth strokes approximately $30^\circ$ headward on the broad, tendinous attachment of the subscapularis. To expose the tendon more fully, move the arm into more external rotation.

3. From the lesser tuberosity, slide your thumb distally along the humerus to find the attachments of the teres major, latissimus, and coracobrachialis. Lift the arm off the table slightly to bring the tissue into slack. Perform back-and-forth strokes in the I–S plane on the medial side of the humerus to release these muscles.


- **Anatomy:** Attachments of the posterior rotator cuff, posterior joint capsule, triceps, and radial nerve (Figs. 6-56A and 6-56B).

- **Dysfunction:** With an irritation or inflammation of the infraspinatus or teres minor, the tenoperiosteal attachment points thicken and become fibrotic. As these muscles interweave with the posterior joint capsule, the capsule also thickens. Thickening of the posterior joint capsule draws the head of the humerus anteriorly and superiorly, contributing to impingement syndrome and limiting medial rotation.

**Position**
- **TP:** Standing
- **CP:** Prone, with forearm over edge of table, in $90^\circ$ of abduction

In this technique, the strokes are along the bone and not into the bone. With each stroke, rock the entire arm in the direction of your stroke.

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**Figure 6-56.** A. Posterior rotator cuff muscles, the triceps, and radial nerve. B. Muscle attachments to the posterior shoulder complex.
Strokes

1. Place both thumbs next to each other, and wrap your hands around the proximal portion of the humerus (Fig. 6-57). Use the thumbs to penetrate through the muscle to perform short, back-and-forth strokes transverse to the shaft of the humerus to release the attachments of the infraspinatus, teres minor, and joint capsule on the posterior glenoid fossa and proximal humerus. For a hypermobile shoulder, it is important to stabilize the anterior humerus with your fingertips and not allow excessive forward translation of the head of the humerus.

2. To palpate the attachment of the long head of the triceps at the infraglenoid tubercle of the scapula, place the fingertips of one hand on the inferior aspect of the glenoid fossa, and have the client resist as you attempt to press his or her elbow into flexion. Using a double-thumb technique, perform a series of back-and-forth, transverse strokes on the attachment site.

3. Release the radial nerve, triceps, posterior deltoid, and the posterior brachialis attachments on the posterior humerus. Use the same double-thumb technique described in the first stroke (see Fig. 6-56). Beginning at the proximal humerus, perform a series of short, scooping strokes transverse to the shaft of the humerus. To release the posterior deltoid with CR MET, have your client lift his or her arm slightly off the table and resist as you press the arm lightly toward the table.

4. Repositioning of the Rotator Cuff Muscles and Deltoid in the Seated Position

   - **Anatomy:** Deltoïd, supraspinatus, infraspinatus, teres minor, and subscapularis (Figs. 6-58 A and 6-58B).

   - **Dysfunction:** The most common dysfunction of the glenohumeral joint is for the humeral head to sit high in the glenoid fossa. The rotator cuff muscles tend to part at the top of the joint and roll inferiorly as the humeral head is held in this sustained superior position. The technique is performed in the sitting position with the arm at 90° abduction, as this is a position of function for eating, reaching, and so on.

   - **Position**

     - **TP:** Standing, facing the table at 45° angle. For treatment, place your front foot on the table. If you have a tall client, have the client sit in a chair.
     - **CP:** Sitting on the table or a chair a few inches from the edge

   - **Strokes**

     These strokes often follow the passive circumduction assessment (p. 264). Your assessment findings help you to determine which of the following strokes to use.

     1. Place your foot on the edge of the table or chair, and rest the client’s forearm on your thigh, with the humerus in the scapular plane. To help reestablish normal function and position, perform CR MET with special attention to areas of restriction.

     - **a.** Abduction—Lift the client’s arm off your thigh, and have the client resist as you press down on the elbow.

     - **b.** Adduction—Tuck your fingers under the client’s elbow, and have the client resist as you attempt to lift the arm off your leg.

     - **c.** Internal rotation—Tuck your hand under the client’s distal forearm. Have the client resist as you attempt to lift the arm.

     - **d.** External rotation—First, lift the wrist a few inches off your leg. Have the client resist as you attempt to press down on the distal forearm (Fig. 6-59).

     - **e.** Horizontal flexion or extension—Have the client resist as you pull the humerus posteriorly or press anteriorly into the client’s elbow.

     2. After each MET is performed, use either your fingertips on the anterior muscles or your thumbs on the posterior muscles to scoop the soft tissue superiorly and toward the midline of the superior glenohumeral joint (see Fig. 6-59B). The intention is to lift the soft tissue toward the highest point of the shoulder. You may perform more brisk, back-and-forth strokes if you find areas of fibrosis.

     3. Stand next to your client, and perform passive circumduction again. The movement should be smooth and pain free. If not, perform this series of METs and STMs again.
5. **Treatment of the Subdeltoid Bursa**

- **Anatomy:** The subdeltoid bursa is located deep under the deltoid and inferior to the acromial arch. It acts as a lubricant during shoulder motion, particularly abduction, and secretes synovium into the joint space (Fig. 6-60).

- **Dysfunction:** Bursae swell when they are inflamed whether as a result of acute trauma or of cumulative stress, such as repetitive overhead activities. With an acute bursitis, the client experiences severe pain in the shoulder region and loses all ability to elevate the arm. Chronic shoulder dysfunction may lead to a drying out of the bursa, eventually leading to adhesions, and an inferior migration of the bursa.

**Position**
- TP: Standing
- CP: Sitting

**Strokes**
Apply some oil or lotion to the client’s upper arm so that you can easily slide on the skin. Hold the client’s distal forearm with one hand, and pull the arm into a gentle traction (Fig. 6-61). Place the shaft of your thumb a few inches distal to the acromion on the

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**Figure 6-58.** A. Muscles of the anterior shoulder complex. B. Posterior deltoid, supraspinatus, infraspinatus, and teres minor, and teres major.
Figure 6-59. A. Sitting MET and OM. Perform METs to release hypertonicity in the muscles of the glenohumeral joint. B. Next, use fingertips or thumbs to reposition the soft tissue toward the most superior part of the joint.

Figure 6-60. Subdeltoid (subacromial) bursa.

Figure 6-61. Using the web space of the hand, perform slow, gentle strokes on the subdeltoid bursa.
lateral arm. Using the fleshy portion of the entire shaft of your thumb and webspace, perform a slow, gentle, continuous stroke toward the acromion. When you reach the acromion, traction the arm and lift it slightly into abduction as you use your thumb to gently press into the arm. Coordinate the movements of the arm and the stroke so that the arm is lifting as the thumb is pumping the excess fluid from the bursa under the acromion. Repeat this pumping a few times. Then begin the stroke again, placing your hand a few inches below the acromion, and perform another long, continuous stroke. In chronic conditions in which the area has a dry and gristly feel, you may use deeper pressure to rehydrate the bursa. For an acute, swollen bursa, begin your stroke close to the acromion, moving superficially. Your next stroke begins a little more distally, milking the excess fluid headward a little bit at a time. Repeat the stroke about ten times.

**CAUTION:** In acute bursitis, use gentle pressure, and do not repeat this stroke more than ten times.

### Study Guide

**Level I**
1. List the four muscles of the rotator cuff. Describe their origins, insertions, and actions.
2. List which muscles are tight and which are weak in the shoulder.
3. Describe the MET for the pectoralis minor and the supraspinatus.
4. Describe the common positional dysfunction of the anterior deltoid. Describe the direction of the massage strokes to correct it.
5. Describe the signs and symptoms of a supraspinatus, infraspinatus, and subscapularis tendinitis.
6. Describe the stroke direction for the teres minor and infraspinatus.
7. Describe the MET for the teres minor and infraspinatus.
8. Describe the scapular stabilization test.
9. Describe the consequences of weak rotator cuff muscles.

**Level II**
1. Describe how to differentiate rotator cuff symptoms from a nerve root irritation in the neck.
2. Describe the signs and symptoms of bicipital tendinitis, subacromial bursitis, impingement syndrome, and adhesive capsulitis.
3. Describe the empty-can test and Speed’s test, and describe the significance of a positive test.
4. List the muscles and ligaments that attach to the coracoid process.
5. Describe the scapular stabilization test.
6. List the muscle attachments to the anterior humerus and their relation to the bicipital groove.
7. Describe what is indicated when the shoulder hikes upward in active abduction.
8. Describe the MET for frozen shoulder.
9. Describe the anatomical boundaries of the coracoacromial arch and the contents within the arch.
10. Describe the causes of rotator cuff disease.

### References

Chapter 6: The Shoulder  |  Techniques

Suggested Readings
