Introduction

The shoulder is responsible for approximately 16% of all primary care musculoskeletal visits. Rotator cuff injuries are the most common problem to affect the shoulder; accounting for 4.5 million physician office visits per year. The emerging healthcare model dictates that these patients will be directed to the "best" provider- and this guide can help make sure that includes you!

Rotator cuff injuries do not occur in isolation, but rather as part of a continuum of dysfunction. The process often begins with a simple muscle imbalance (Upper Crossed Syndrome) that pulls the scapula into a dysfunctional movement pattern (Scapular Dyskinesis) and allows for painful pinching of the rotator cuff tendon and associated bursa (Shoulder Anterior Impingement Syndrome- SAIS). Repetitive pinching traumatizes the tendon (Rotator Cuff Tendinopathy), ultimately leading to tear.

This continuum is quite predictable. The renowned shoulder orthopedist, Dr Charles Neer, estimated that 95% of rotator cuff tears were from repetitive impingement (SAIS) rather than acute injury. Of those, 100% started with scapular dyskinesis, a component of upper crossed syndrome.

Identifying the true “functional” origin of “structural” pathology will dramatically improve your clinical outcomes. This guide helps by summarizing the etiology, assessment and management for each component of the shoulder dysfunction continuum. The appendix provides pictures and descriptions of all relevant orthopedic assessments and exercises.

The material is taken from ChiroUp.com- a peer-reviewed, online platform of exceptional evidence-based clinical and business resources that are simple to access and implement today- thereby improving clinical outcomes, patient satisfaction, and practice incomes tomorrow.

We hope that you will enjoy the material contained in this guide and invite you to learn more about ChiroUp by visiting our website or starting your free trial that provides access to hundreds of videos and other practical resources for clinical and business success.

Tim & Brandon
ChiroUp Co-founders
The shoulder is responsible for approximately 16% of all primary care musculoskeletal visits. (1) Many of these patients exhibit an often overlooked, altered scapular position and motion pattern called, “Scapular dyskinesis.” (2,3) The dominant shoulder is affected more frequently. (4)

Normal scapulohumeral motion maintains the humeral center of rotation directly above the concave scapular glenoid throughout the shoulders range of motion. This integrated motion between the scapula and humerus provides efficient function and joint stability. (5) When this rhythm is disrupted by abnormal scapular motion, the resulting disproportionate humeral shift creates increased stress on the shoulder capsule and rotator cuff. (5)

Muscular imbalance, neurologic injury, or joint pathology are potential causes of scapular dyskinesis. The most common origin of scapular dyskinesis is muscular imbalance resulting from a combination of weakness, tightness, fatigue or altered activation. (6) Tightness in the pectoralis minor or short-head of the biceps leads to dyskinesis by placing excessive pull on the coracoid process. (7) It is not completely clear whether pec minor tightness is a causative factor or an adaptive response to scapular malposition. (8) Weakness or fatigue in the lower trapezius or serratus anterior triggers dyskinesis from inadequate acromial elevation. (5,9,10) Dyskinesis can occur from dysfunction in the distal kinetic chain, including hip abductor or core weakness. (52) Hyperkyphosis or “slouched” postures are known contributors. (11-13)

Scapular dyskinesis may be secondary to various shoulder pathology, including AC separation, A/C instability, A/C arthrosis, labral injury, glenohumeral internal derangement, glenohumeral instability, biceps tendinitis, and prior clavicle or scapula fracture. (7,10,14) Neurologic origins of scapular dyskinesis include cervical radiculopathy or peripheral neuropathy. (7,15) Injury to the spinal accessory nerve, long thoracic nerve, or suprascapular nerve is the cause of scapular dyskinesis in approximately 5% of cases. (16)

Scapular dyskinesis diminishes subacromial space and leads to decreased rotator cuff strength, impingement symptoms, and eventual rotator cuff damage. (17-22) One hundred percent of patients with shoulder impingement demonstrate dyskinesis. (3) Uncoordinated movement of the scapula and humerus leads to a loss of dynamic stability in the glenohumeral joint via excessive strain on the anterior glenohumeral ligaments, with concurrent diminished rotator cuff strength. (3,23-25) Sixty-four percent of patients with glenohumeral instability demonstrate scapular dyskinesis. (3)

Although scapular dyskinesis is linked to a variety of shoulder problems, it may be asymptomatic initially. Up to 76% of healthy college athletes demonstrate some form of asymptomatic scapular asymmetry. (26) When symptomatic, early complaints can include pain in the anterior or posterosuperior aspect of the shoulder. Discomfort may radiate inferiorly toward the lateral deltoid or superiorly into the trapezius region. Pec minor tightness may generate pain over the coracoid. (27) The consequences of long-standing altered mechanics leads to more well-recognized pain syndromes.

The goal of clinical evaluation is to recognize altered scapular mechanics and identify the underlying causative factors. (9) The acronym “SICK” scapular syndrome has been used to identify the components of scapular dyskinesis, including Scapular malpo-

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**Scapular Dyskinesis Summary**

**Evaluation**
- Lateral Scapular Slide Test
- Quadruped Rock
- Scapular Dyskinesis Test
- Scapulohumeral Rhythm Test
- SICK Scapula

**Management Soft Tissue**
- STM- Biceps Brachii
- STM- Pec Minor
- STM- Upper Trapezius

**Manipulation/Mobilization**
- Manipulation-Cervical and Thoracic
- Mobilization-Scapula

**Phase I exercises**
- YTWL Scapular Depression
- Trapezius Stretch
- Corner Pectoral Stretch
- Low Row
- Brugger with Band

**Clinical Pearls**
- Scapular dyskinesis diminishes subacromial space and leads to decreased rotator cuff strength, impingement symptoms, and eventual rotator cuff damage.
- 100% of patients with shoulder impingement demonstrate dyskinesis.
- 5% of patients with dyskinesis have neurologic injury/ damage (spinal accessory, long thoracic, suprascapular)
- Scapular Dykinesis can occur from core and hip abductor weakness.
- Scapular dyskinesis becomes more apparent with dynamic testing, particularly during the lowering phase of arm movement.
- Recognition and rehabilitation should begin independent of (generally absent) symptoms.
Scapular Dyskinesis Summary (Continued)

Situation, Inferior angle prominence, Coracoid tenderness/malposition, and dysKinesis. (16) Assessment begins with observation for winging (prominence of the inferior angle or medial border of the scapula) or asymmetry. (3) The lateral scapular slide test compares side-to-side measurements of the distance between the inferior angle of the scapula to the adjacent spinous process. The validity of this type of static measurement is open to discussion. (28-30)

Scapular dyskinesis becomes more apparent with dynamic testing, particularly during the lowering phase of arm movement. (3-28) Literature defines several tests for the dynamic assessment of scapular dyskinesis including the Scapulohumeral rhythm test and Scapular dyskinesis test. (27,32,33) The Scapular dyskinesis test involves visual assessment of a patient performing weighted shoulder flexion and abduction. The clinician observes for the presence of winging or dysrhythmia (early, excessive, or discoordinated motion).

Range of motion deficits are possible. Posterior shoulder tightness may limit internal rotation, which leads to scapular protrac-tion and dyskinesis- particularly in overhead athletes. Assessment of posterior capsule tightness is performed by measuring internal rotation at 90 degrees of abduction, by having the patient reached behind their back to the highest spinal level, or by assessing horizontal adduction. (34) Internal rotation should be measured while stabilizing the scapula. (35) Palpation may demonstrate tenderness over the coracoid or subacromial region. Trigger points are possible in the pectoral, biceps, upper trapezius, and rotator cuff muscles. Scapular dyskinesis is often part of a larger biomechanical problem- “Upper crossed syndrome”. Clinicians should assess for even more distant origins of instability, including hip abductor weakness.

Several functional maneuvers exist to assess the effect of manual correction of scapular dyskinesis on rotator cuff strength and impingement symptoms. The Scapular assistance test involves the clinician assisting with active acromial elevation to determine whether that assistance decreases impingement symptoms. The test is performed while the patient abducts their shoulder in a scapular plane, while the clinician pushes the inferior medial border of the scapula laterally and upward. Impingement related to muscular imbalance will likely improve with assistance. The Scapular retraction test is performed in a similar fashion, except the clinician assists with retraction and posterior tilt of the scapula (pushing the inferior angle of the scapula toward the spine) while the patient abducts in a scapular plane. Relief of impingement symptoms and increased rotator cuff strength is a positive test. (21) The Scapular repositioning test is performed with the patient consciously focusing on holding down the scapula in a posterior tilted and depressed position while abducting their arm in a scapular plane. A positive test results in improved rotator cuff strength and decreased impingement symptoms. (37)

Although there may be a role for imaging in the diagnosis of related shoulder disorders, scapular dyskinesis is solely a clinical diagnosis.

Conservative management is capable of producing significant improvements in pain and function, despite the fact that research shows static and dynamic measurements of scapular dyskinesis remain relatively unchanged after three months of care. (38) The successful management of scapular dyskinesis requires identifying and addressing all of the causative components. Treatment should begin by restoring flexibility of tightened and hypertonic tissues. Myofascial release and stretching may be necessary for the pec minor, biceps, and upper trapezius. (39-40) Strengthening exercises should be directed at the serratus anterior, lower trapezius, and middle trapezius. (41-43)

The middle and lower trapezius may be strengthened in side-lying forward flexion, external rotation, prone extension, and/or pure horizontal abduction. (44,45) The serratus anterior is activated in various quadruped and push-up positions. (41) Rehab of scapular dyskinesis is most effective when muscles are activated in functional patterns versus isolated strengthening. (46) Functional exercises useful for rehabing scapular dyskinesis include: inferior glide and low row. (47) Strengthening exercises should be performed with the patient focusing on scapular retraction, thereby, increasing serratus anterior and lower trapezius activation. Patients should avoid “shrugging” their shoulders, or otherwise activating the upper trapezius. Patients demonstrating weakness in the hip abductors or core musculature may require proximal stabilization prior to implementing more specific scapular stabilization. (48,49) Scapular mobilization may help assist in restoring scapular thoracic mobility. The use of manipulative therapy is a “preferred” treatment that may accelerate recovery. (50,51)
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“Upper Crossed Syndrome” aka “Cervical Crossed Syndrome” was first described by Vladimir Janda in 1979 as a predictable pattern of alternating tightness and weakness involving the neck and shoulders. (1) The condition frequently contributes to neck and back pain and is associated with diagnoses ranging from cervicogenic vertigo to rotator cuff pathology. (2)

Upper quadrant muscular dysfunction does not occur at random, but rather, in a predictable pattern of altered posture as the body attempts to reach homeostasis. (3-5) The process typically begins when a muscle or muscle group is overused in a certain direction and becomes shorter and tighter (adaptive shortening). The antagonist muscles opposing this action are subject to prolonged stretch and tend to become longer and weaker (stretch weakness). (6)

Janda classified muscles as either “postural” or “phasic.” Upper quadrant “postural” muscles (including the upper trapezius, levator, SCM, and pec major) are predisposed to tightness, while “phasic” muscles (including the rhomboid, serratus anterior, scalenes, and middle & lower trapezius) respond to dysfunction by becoming weaker. (1,4,7) The term “upper crossed syndrome” was coined because a line drawn to connect the tight muscles forms a cross with a second line drawn between the weak muscles. (8) (See figure at right.)

Upper crossed syndrome is a direct result of “flexor-dominated” postures (i.e. forward use of the arms and head). This process begins in the classroom as a child and progresses with age throughout the working years. (9) Most occupations, from computer operator to manual labor, are “flexor-dominated.” (10) Workstation users are particularly predisposed from prolonged static flexor dominated postures. (9,11) Sedentary lifestyles may contribute to the problem. (9) Non-mechanical factors like low self-esteem or depression may trigger upper crossed postures. (12)

Muscular balance is required for normal function, and muscular imbalance leads to dysfunctional and inappropriate movement patterns. (13) This has a direct impact on joint surfaces and often leads to self-perpetuating cycle of recurrent joint dysfunction, degeneration and changes in CNS motor control. (13) Longstanding postural dysfunction may cause joint degeneration (1,4,17) and changes in CNS motor control. (4,16)

Poor posture can negatively affect proprioception, balance, gait, and functional performance. (17) Poor posture has been associated with increased mortality rates in older adults. (17) Upper crossed syndrome places excessive stress on the upper thoracic region and has been linked to T4 syndrome – a cause of chest pain and pseudo angina. (8)

Upper crossed patients often complain of neck pain, interscapular pain, and headaches. (2) The condition is thought to contrib-
ute to many upper body diagnoses, including cervical and thoracic intersegmental joint dysfunction, sprain/strain, discogenic pain, degeneration, vertigo, rotator cuff syndrome, thoracic outlet syndrome, costovertebral dysfunction, and TMD.

Traditional “structural” diagnoses focuses on a “tissue” source for the patient’s symptoms (i.e. facet capsule, supraspinatus tendon, etc). Upper crossed syndrome is a “functional” diagnosis that requires identification of the underlying factors that contribute to structural lesions.

Assessment for upper crossed syndrome begins with visual inspection. The ideal standing posture, when viewed from the side, is a plumb line passing through the ear, shoulder, greater trochanter, and slightly anterior to the lateral malleoli. (19,20) Postural evaluation of patients with upper crossed syndrome will reveal a forward head posture with upper cervical extension, elevated and protracted shoulders, scapular winging, and a thoracic hyperkyphosis. (8)

Hypertonicity will be found in the upper trapezius, levator, pec major, and SCM. Palpation will often demonstrate tenderness or trigger point activity in the aforementioned muscles as well as the concurrently weak rhomboids, serratus anterior, middle & lower traps, scalenes and deep neck flexors.

Functional assessment of neck flexion can be performed with a “Neck flexion test.” The test is performed when a supine position is asked to lift their head several inches off of a table to look at their toes. The normal firing pattern for neck flexion is the longus capitus, longus colli, SCM, and finally, anterior scalenes. The clinician observes for a “normal” movement pattern, which would be initiated with a chin tuck and smooth reversal of the cervical lordosis. An “abnormal” screen would result in the chin moving forward into protraction from over compensation by the SCM. Abnormal neck movement suggests weakness of the deep neck flexors.

The “Deep neck flexor endurance test” is another maneuver for assessing the deep neck flexors. This test starts with the patient in a supine, hooklying position. The patient performs chin retraction, then lifts their head an inch off of the table. The clinician places their flat hand on the table below the patient’s occiput. If the patient’s head begins to lower or their anterior neck skin folds separate, they are reminded to “tuck your chin and hold your head up.” The test is timed until the patient’s head touches the clinician’s hand for more than one second. The average endurance for men is about 40 seconds and 30 seconds for women. Those with neck pain average closer to 20 seconds. Low endurance suggests neck flexor weakness with a predisposition to over utilize the SCM, platysma, and hyoid- resulting in an upper crossed posture and neck pain. (21,22)

Patients with upper crossed syndrome will often demonstrate abnormal shoulder abduction. The normal sequence for shoulder abduction is progressive firing of the supraspinatus, deltoid, infraspinatus, middle and lower trapezius, and contralateral quadratus lumborum. Patients with upper crossed syndrome frequently demonstrate early shoulder elevation (prior to 60 degrees of abduction) due to overactivity of the upper trapezius and levator scapula. (23,24)

Patients with upper crossed syndrome often have weak scapular stabilizers (serratus anterior). Scapular stability may be assessed by the Quadruped rock test (aka Push up test). This assessment is performed by having the patient assume a quadruped position and slowly rock forward and backward while the clinician observes for signs of scapular winging.

Joint dysfunction may arise secondary to muscular imbalance. (4,14-16) Janda noted that upper crossed syndrome creates a predictable pattern of joint dysfunction involving the atlanto-occipital joint, C4-5, C7-T1, T4-5, and the glenohumeral joint. (8,25,32)

Management of upper crossed syndrome should first attempt to eliminate abnormal proprioceptive input through joint mobilization and myofascial release. (B) Rehab then progresses sequentially through stretching, strengthening, and finally, fascilitation of normal movement patterns. (4)

Sherrington’s law of reciprocal inhibition states that when one muscle is hypertonic, its antagonist relaxes. (26,27) This law necessitates that hypertonic muscles be lengthened before embarking on the process of strength training. Stretching and myofascial release should be directed at the pectoral muscles, SCM, upper trapezius, and levator. Additionally, release of myofascial adhesions may be necessary in the rhomboids, serratus anterior, middle and lower traps, and scalenes. Manipulation may be
Upper Crossed Syndrome (Continued)

necessary for restrictions in the cervical, thoracic, and shoulder regions. (32)

Strengthening exercises should focus on the rhomboids, serratus anterior, middle & lower trapezius, and scalenes. Functional rehabilitation must include proprioception and exercises to “groove new movement patterns.” (28) Specific rehab exercises would include chin retraction, Brugger’s position, and scapular stabilization. (29-31) Patients should be counseled to reduce repetitive stress- including ergonomic workstation modification.

References
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Shoulder Anterior Impingement Syndrome (SAIS), first described by Neer in 1972, is caused when the supraspinatus tendon becomes painfully entrapped between the acromion and the greater tuberosity of the humerus during elevation and/or internal rotation of the arm. Repetitive impingement is thought to precipitate a cascade of shoulder dysfunction including supraspinatus tendon disruption, subacromial bursitis, biceps tendonitis, degeneration of associated joints and eventually, rotator cuff rupture. Neer proported that 95% of chronic rotator cuff tears are due to impingement. (7)

SAIS results from repetitive injury and its development is partially related to the available subacromial space. Conditions that diminish the subacromial space including acromioclavicular degeneration, osteophytes or a thickened coracoacromial ligament can predispose patients to “outlet impingement” SAIS (1). Perhaps the greatest threat to subacromial space comes from having malshapen acromion. Approximately 20% of the population has a “Flat” (type I) acromion, 55% has a “Curved” (type II) and 25% has a “Beaked” (type III) acromion. (8) Type III is more common in males and is present in 75% of patients with a rotator cuff tear. (8) Neer and others purport that the pathoanatomical changes to the acromion may be the result of longstanding impingement rather that its precursor. (23,24) “Upper crossed syndrome” and scapular dyskenesis are significant predisposing factors for SAIS.

In addition to its primary function of generating torque, the rotator cuff is a dynamic stabilizer of the glenohumeral joint and works to depress the humeral head during arm elevation. This stabilizing force from the rotator cuff offsets the humeral elevation that would otherwise result from unopposed deltoid contraction during arm elevation. "Non-outlet impingement" SAIS results from loss of normal humeral head depression as a result of rotator cuff muscle weakness or denervation.

Rotator cuff lesions progress in a self-perpetuating cycle of dysfunction. Repetitive insults damage the tendon and lead to tendon degeneration. This weakens the tendon and diminishes its ability to oppose superior shearing force produced by the deltoid during arm abduction. The tendon becomes impinged, producing further insult. (25) As tendon fibers fail, the enduring fibers remain under tension, thereby increasing load and the likelihood of failure. (26)

SAIS is the most common disorder of the shoulder and accounts for 44-65% of all shoulder complaints seen by physicians (2). Rotator cuff problems are common in younger and middle aged populations. Those who perform repetitive overhead activity are at greater risk for SAIS. This includes athletes who participate in: swimming, baseball, volleyball, weightlifting and tennis as well as professions like: carpenters, electricians, painters and wall paper hangers.

SAIS is a continuum of degeneration that Neer categorized into three stages. Stage 1 is common in younger patients and is
characterized by acute but reversible pain, swelling and hemorrhage. Stage 2 typically affects patients between the ages of 25-40 who have suffered with SAIS for months or years. Stage 2 is characterized by tendonitis and permanent fibrosis of the supraspinatus tendon, biceps tendon and subacromial bursa which may require surgical intervention. Stage 3 is the culmination of a prolonged irritation that has caused significant tendon degeneration and fibrosis for many years. It typically affects patients over the age of 40 or 50 and is characterized by irreversible mechanical disruption of the rotator cuff tendon. Stage 3 often includes osseous degenerative changes including cystic changes to the greater tuberosity and A/C degenerative changes, i.e. acromial sclerosis and osteophytes. Biceps tendon degeneration and/or rupture is common in stage 3. Acrimoplasty and rotator cuff repair are frequently required for the management of stage 3 SAIS.

The onset of SAIS is often related to a period of overuse. Initially, symptoms may be limited to a sharp pain during overhead activity or while reaching behind the back to fasten a bra or close a zipper. As the condition progresses, the patient may develop a constant ache that is present at rest. Nighttime pain is common, often disrupting sleep. Sleeping on the affected side may exacerbate pain. The discomfort is often located over the anterior shoulder and lateral deltoid areas.

The clinical presentation may include decreased active and passive ROM in forward flexion, abduction or internal rotation. The patient often demonstrates a positive “painful arc” between 60-120 degrees of abduction. Forced passive horizontal adduction may provoke pain. Resisted external rotation with the arm at the side or at 90 degrees of elevation (Horn Blowers/ Patte test) is generally painful. Internal rotation resisted strength test (IRRST), may demonstrate weakness of internal rotation while the shoulder is abducted. Loss of strength from pain inhibition is common. Palpation reveals tenderness over the greater tuberosity and supraspinatus insertion as well as the anterior edge of the acromion.

Neer test, Hawkins-Kennedy test and Supraspinatus isolation/ “empty can” test have been shown to be the most clinically useful tests for the evaluation of SAIS. A negative Neer test, by itself, reduces the overall likelihood of SAIS to less than 14% (3). The Scapular assistance test will likely demonstrate a decrease in pain upon active elevation of the arm (in a scapular plane) when the examiner facilitates “normal” scapular retraction and upward rotation. A positive Drop arm test suggests a rotator cuff tear.

Scapular dyskinesis is present in up to 100% of impingement cases. (9) Several functional maneuvers exist to assess the effect of manual correction of scapular dyskinesis on rotator cuff strength and impingement symptoms. The Scapular assistance test involves the clinician assisting with active acromial elevation to determine whether that assistance decreases impingement symptoms. The test is performed while the patient abducts their shoulder in a scapular plane, while the clinician pushes the inferior medial border of the scapula laterally and upward. Impingement related to muscular imbalance will likely improve with assistance. The Scapular retraction test is performed in a similar fashion, except the clinician assists with retraction and posterior tilt of the scapula (pushing the inferior angle of the scapula toward the spine) while the patient abducts in a scapular plane. Relief of impingement symptoms and increased rotator cuff strength is a positive test. (10) The Scapular repositioning test is performed with the patient consciously focusing on holding down the scapula in a posterior tilted and depressed position while abducting their arm in a scapular plane. A positive test results in improved rotator cuff strength and decreased impingement symptoms. (11)

The differential diagnosis of SAIS includes: partial or full thickness rotator cuff tear, adhesive capsulitis, biceps tendon rupture, A/C or glenohumeral osteoarthritis, labral injury, calcific tendonitis, cervical radiculopathy/ referral, inflammatory arthropathy, avascular necrosis, neoplasm, suprascapular nerve entrapment and TOS.

No definitive criteria exist for the imaging of SAIS. In general, shoulder radiographs are appropriate in cases of trauma, severe pain, prolonged pain or the inability to abduct > 90 degrees (4). Radiographic imaging of the shoulder in cases of suspected SAIS should include: A/P, internal rotation and axillary (lateral) views. An “outlet view” (standard “Y” view with 5-10 degree caudal tilt) is most useful to demonstrate acromial morphology and osteophytes in the supraspinatus space. Ultrasound can identify tendon disruptions but MRI is the imaging of choice for shoulder pathology and is useful to differentiate between findings consistent with SAIS vs. rotator cuff tear. An MRI arthrogram enhances clinical accuracy in detecting tendon tears or labral injury (5).
The management of shoulder problems poses a challenge for clinicians. Studies report long-term unfavorable outcomes in 40-50% of primary care patients (2). Successful management of SAIS should initially focus on restoring range of motion while avoiding aggravating movements i.e. elevation and internal rotation. Patients should avoid overhead presses, lateral raises and push-ups. Selective rest may be necessary for some patients. Ultrasound, anti-inflammatory modalities and ice may be useful initially. NSAIDS are often beneficial.

In office management should include soft tissue manipulation or myofascial release of associated hypertonic muscles with specific emphasis on the pec, biceps, subscapularis, infraspinatus, teres minor and levator. IASTM may be performed prudently over the supraspinatus tendon and associated adhesions. Manual manipulation is needed to address restrictions in the cervical, upper thoracic thoracic and shoulder areas (6). There is evidence to suggest that cervicothoracic and thoracic spine manipulation may help decrease shoulder pain while improving mobility and function. (19-22) Elastic Therapeutic Tape, applied across the supraspinatus, deltoid and teres minor, may promote scapular movement and strength with faster recovery times and lower disability. (13-15) Thoracic spine manipulation has been shown to significantly decrease pain and disability for SAIS patients. (18)

Stretching should address tightness in the posterior capsule and internal rotators with specific emphasis on the: pec, biceps, subscapularis, infraspinatus, teres minor, levator and a cross body stretch. Strengthening may begin incrementally as the patients pain-free range of motion allows. Strengthening should begin with isometric exercises and progress as tolerated. Eccentric strengthening of the rotator cuff combined with eccentric/concentric exercises for the scapular stabilizers may produce improved outcomes when compared to less specific programs. (12,16,17) The ultimate goal of stability training is to restore normal posture and arthrokinematics. Specific strengthening should include: scapular retractions, shoulder flexion, isolated supraspinatus, horizontal abduction, extension, external rotation and reverse shrugs.

Return to play should begin gradually and release to full activity is appropriate when ROM is full and pain free and strength testing reveals no significant weakness as compared to normal. Recalcitrant cases may require steroid injections or surgical consult.

References
The shoulder is a ball-and-socket joint that is afforded great mobility at the sacrifice of structural stability. The rotator cuff is the synthesis of the tendons of the supraspinatus, infraspinatus, teres minor and subscapularis into the capsule of the glenohumeral joint. The supraspinatus, infraspinatus and teres minor insert on the superior, middle and inferior facets of the greater tuberosity, respectively. The subscapularis is the largest and strongest muscle of the group and inserts on the lesser tuberosity. Collectively, the primary function of the rotator cuff is to stabilize the shoulder while the larger muscles move it (i.e. force couple-the powerful deltoid abducts the arm while the rotator cuff compresses the humeral head into the glenoid to thwart superior translation). The supraspinatus is also called upon to eccentrically decelerate an athlete’s arm after ball release, tennis serve, etc.

Rotator cuff injury is the most common problem to affect the shoulder, accounting for 4.5 million physician office visits per year. (1) Injuries range from a mild strain of a single tendon to complete rupture of multiple tendons. Strains of the rotator cuff can occur abruptly from a solitary insult (falling, pushing, pulling, throwing or lifting) but more commonly (>90%) develop from multiple factors including repetitive injury and age-related attrition. (2,3,4,31,33) Damage often begins at the undersurface of the supraspinatus tendon, 13-17 mm posterior to the biceps tendon (near the junction of the supraspinatus and infraspinatus), and progresses from a partial to a full thickness tear. (54,56,57) A “full thickness tear” is sometimes termed a “complete tear” and is not a rupture, but rather a hole or a slit in the tendon much like what would be created by running a knife length-wise down the center of a rope. Most tears begin in the supraspinatus but may progress to involve the infraspinatus and subscapularis. (3)

The rotator cuff is predisposed to damage by a multitude of factors including obesity, hypercholesterolemia, genetics or a history of corticosteroid injection (5-10). Impingement and hypovascularity may produce recurring damage and impair the cuff’s ability to recover. In 1934, Codman described a “critical zone” of relative hypovascularity, 10–15 mm proximal to the insertion of the supraspinatus tendon. (49) This hypovascularity was more pronounced on the “articular” undersurface and was thought to help explain the increased incidence of “articular” surface tears as compared to “bursal” tears.

More recently, Goodmurphy and Brooks (50,51) have refuted the existence of a “critical zone” with research that showed no significantly diminution in blood flow to the area. New data suggests that areas closest to the tendon tear are not hypovascular at all. In fact, some researchers have actually reported relative hyper-perfusion within the critical zone. (52) Current technology including laser doppler flowmetry studies show a hyper-vascular response at the edge of the tears. (53) Goodmurphy affirmed that the avascularity of the critical zone identified during prior cadaveric studies could have been an artifact of techniques- most notably keeping the cadaveric arm abducted during perfusion.
This research challenges the notion of a simple anatomical origin of hypovascularity at rest. It does not however, refute the concept of functionally diminished blood flow during overhead activity or via traction ischemia. Shoulder abduction is thought to impede blood flow by “wringing out” this critical zone. As we age, the natural vascularity of our tissue decreases while degenerative spurring increases, thereby advancing the age-related progression of degenerative cuff tendon failure. Smoking diminishes blood flow and is another known risk factor for the development of rotator cuff pathology.

Neer purported that 95% of chronic rotator cuff tears are associated with impingement. Repetitive overhead activity predisposes a patient to impingement related injury- particularly sports like baseball, swimming, volleyball, tennis, rowing, weight lifting and archery and jobs including carpentry, painting, wall paper hanging, cleaning windows and washing/ waxing cars. The unilateral nature of these tasks makes rotator cuff injury more common in the dominant arm. Patients with scapular dyskinesis or upper crossed syndrome are highly predisposed to rotator cuff damage from repetitive impingement. A detailed discussion of rotator cuff tendinopathy from impingement can be found in the ChiroUp protocol "Shoulder anterior impingement syndrome".

Like tendinopathies affecting other areas of the body, the etiology of rotator cuff maladies is now considered more “degenerative" than "inflammatory”- wherein a classic inflammatory reaction is histologically absent in lieu of thinning, degenerated and disorganized collagen fibers and other signs associated with a failed healing response. Some authors hypothesize that rotator cuff tendon degeneration may actually precede impingement in a self-perpetuating cycle of dysfunction. The process starts when an insult damages the tendon and leads to tendon degeneration. This weakens the tendon and diminishes its ability to oppose superior shearing force produced by the deltoid during arm abduction. The tendon becomes impinged, producing further insult. As tendon fibers fail, the enduring fibers remain under tension, thereby increasing load and the likelihood of failure.

The clinical presentation for rotator cuff injury differs significantly between acute and chronic tears. Acute injuries, resulting from falls, throws or other powerful movements, begin as a “tearing” or “snapping” feeling accompanied by severe pain and weakness, particularly shoulder abduction. Whereas chronic or degenerative tears usually begin silently with widely variable symptoms becoming more evident as the tear progresses. Patients often report gradual onset pain and weakness accompanied by crepitace. Pain may be localized to the anterolateral aspect of the shoulder but can radiate down the arm. Early symptoms are provoked by overhead activity and may progress to the point that the patient has difficulty raising their arm overhead. Pain is often worse at night, particularly when lying on the affected shoulder. Symptoms may be objectively tracked with the Disabilities of the Arm Shoulder and Hand. (DASH)

Clinical evaluation of the rotator cuff begins with observation and palpation for possible atrophy involving the deltoid, infraspinatus or supraspinatus (Rent sign). Palpation below the acromion may demonstrate crepitus on movement. Shoulder range of motion testing will likely demonstrate limited passive internal rotation and decreased active elevation and abduction. Internal rotation may be assessed by having the patient reach behind their back and slide their extended thumb as high on the spine as possible (Appley’s inferior scratch test). Slightly diminished ROM on the patient’s dominant shoulder is common. Substantial limitation in passive forward flexion and passive abduction may suggest the onset of adhesive capsulitis.

Clinicians should perform isolated strength testing of each rotator cuff muscle to assess for pain or weakness. The supraspinatus
A Drop arm test can help detect weakness related to tendon tear. (37) The test is performed by passively abducting the patient’s shoulder to 90 degrees then and asking the patient to slowly lower their arm to their side. The External Rotation Lag Sign (ERLS) demonstrates high specificity (98%) and acceptable sensitivity (56%) for detecting full thickness tears of the supraspinatus tendon. (47, 48) The test is performed by flexing the seated patient’s elbow to 90 degrees with 20 degrees of shoulder abduction. The clinician then passively takes the patient’s shoulder into a position of maximal external rotation. The patient is then instructed to hold that position. The test is positive if the patient cannot maintain this position—evidenced by retreating into internal rotation. Clinicians should assess for signs of shoulder anterior impingement syndrome including a positive painful arc, positive Neer’s test and positive Hawkins test. Biceps tendon tears frequently accompany rotator cuff injury and should be investigated. (35)

The importance of proper scapulohumeral rhythm cannot be overstated. The scapula serves as a functional platform for proper glenohumeral mechanics, and alterations in normal mechanics may lead to pathology. Scapular dyskinesis and upper crossed syndrome are two of the most significant contributors to rotator cuff pathology. Clinicians should assess to ensure that the patient’s glenohumeral to scapulothoracic motion is a 2:1 ratio (i.e., 180 degrees of abduction = 120 degrees glenohumeral + 60 degrees scapulothoracic motion). Clinicians should assess for scapular winging, which may become more pronounced when performing the “Quadruped rock test”. Evaluation of the remainder of the kinetic chain may demonstrate a need to address deficits in hip mobility and core stability as these problems are associated with shoulder injury in throwers. (18, 19)

Combining assessments into clusters can improve diagnostic accuracy. Murel and Walton (20) demonstrated a 98% probability of full thickness rotator cuff tear in patients exhibiting at least three of the following four findings: age over 60, supraspinatus weakness, weakness in resisted external rotation and positive signs of impingement.

Clinicians should base their decision to image the shoulder on whether the outcome of the study will affect treatment. Acute injury in a young patient suspected of having a rupture may warrant immediate advanced imaging, whereas an 80-year old patient with slow onset shoulder pain and weakness may not. Plain films would include AP, axillary, supraspinatus outlet and “Y” views. Diminished acromial-humeral distances (<7mm) on the AP view, are associated with rotator cuff tears. (21, 31) Acromial changes (Type I, II, III) are associated with impingement syndrome. (22) Sclerosis and spurring of the acromion and greater tuberosity are common in older populations.

In cases where surgery is contemplated, both ultrasound and MRI are highly accurate (90%) in detecting complete rotator cuff tears. (21, 23) MRI arthrography is the most sensitive test, particularly for detecting partial tears. (34) The likelihood of finding a rotator cuff tear on advanced imaging is relatively proportionate to the patient’s age. Researchers have shown that asymptomatic rotator cuff defects are present in 50% of people over 70 years of age and 80% of people over 80 years of age. (24) Not all tears are the source of the patient’s symptoms.

In addition to scapular dyskinesis and shoulder anterior impingement syndrome, the differential diagnosis for rotator cuff injury includes cervical radiculopathy, biceps tendonitis, calcific tendonitis, A/C joint injury, labral injury, osteoarthritis, instability, fibromyalgia, adhesive capsulitis, acute bursitis, myofascial pain syndrome, thoracic outlet syndrome, fracture, infection, neoplasm and somatovisceral referral—particularly cardiac.

Although there is no consensus on the most appropriate management for rotator cuff injuries, current research suggests that conservative care should be the first choice for most non-traumatic tears. (25, 45) The decision to initiate conservative versus surgical management should be based on acuity, tear size, age and loss of function. (5) Bartolozzi (27) identified three factors...
associated with a poor prognosis for conservative management of rotator cuff injury: full thickness tears greater than 1 cm, symptoms lasting more than one year and functional impairment/weakness. Ruptures and larger tears (> 1 cm) in younger populations may be best addressed surgically before irreversible retraction. (5) Data suggests that conservative management of partial thickness and chronic full thickness tears yields good outcomes. (5,28,29) Success rates for conservative care vary between 33-92%, and the prognosis seems to be based on the patient's history, tear size and duration of symptoms. (25)

The conservative management of rotator cuff injuries should include activity modification, stretching, strengthening and restoration of scapular mechanics. Patients should avoid painful overhead activity, carrying heavy objects and sleeping on the affected side, especially with the arm stretched overhead. Patients may benefit by sleeping on the unaffected side with a pillow between their affected arm and trunk. Smokers should consider a cessation program. Overweight patients would benefit from a diet and aerobic exercise regimen.

Immobilization of injured tendons promotes adhesion and delays recovery, however clinicians must carefully weigh the balance of aggravating symptoms and encouraging recovery. (66,67) Early interventions should minimize stressful loading of the injured tissues. Stretching and myofascial release techniques may be appropriate for the pectoral muscles, infraspinatus, teres minor, subscapularis, trapezius, levator and posterior capsule. Transverse friction massage or IASTM may be implemented judiciously to enhance remodeling of scar tissue. The use of elastic therapeutic tape may help to facilitate or inhibit muscular function. Joint mobilization and manipulation is appropriate for restrictions in the scapulothoracic, glenohumeral joint, and cervicothoracic spine. (30) There is evidence to suggest that cervicothoracic and thoracic spine manipulation may help decrease shoulder pain while improving mobility and function. (41-44)

Self-managed home exercise programs show similar outcomes to those directed in-office by a physical therapist. (46) Gentle range of motion exercises can begin with Codman pendulum exercises, wall walking and stick or towel exercises. Stretching exercises should focus on restoring adduction, internal rotation and external rotation. This may be accomplished by a cross body stretch and sleeper stretch. Progressive resistance exercises can be implemented as tolerated for the rotator cuff and periscapular musculature, particularly the external rotators, serratus anterior and lower trapezius. Stabilization exercises will progress from isotonic strengthening to more sport-specific actions, including eccentric strengthening and endurance. Clinicians should address any likely concurrent deficits in scapular mechanics by implementation of a scapular dyskenesis or upper crossed syndrome rehab protocol. Clinicians should correct deficits of hip mobility or trunk stability in throwers.

The use of NSAIDS should be limited as these drugs inhibit collagen synthesis and may interfere with natural healing. (71,72) Although PRP injections have been shown promote tendon healing (68,69), existing literature does not support their use for rotator cuff tendinopathy. (56,70,71) Patients who fail conservative therapy are candidates for orthopedic consult.

References


22. Neer


**Lateral Scapular Slide Test**

The lateral scapular slide test compares side-to-side measurements of the distance between the inferior angle of the scapula to the adjacent spinous process. Increased distances or the presence of “winging” suggests scapular dyskinesis.

The relevance of this type of static measurement is questionable. Dynamic assessments of scapular dyskinesis are preferred.

**Quadruped Rock Test**

The patient assumes a quadruped position, i.e. on “all fours”. The patient slowly rocks forward and backward while the clinician observes for signs of scapular winging and hip inflexibility. (aka Push Up Test)
**Scapular Dyskinesis Test**

This test involves visual assessment of a patient performing weighted shoulder flexion and abduction. The presence of winging or dysrhythmia (early, excessive, or discoordinated motion) defines scapular dyskinesis.

**Scapulohumeral Rhythm Test**

Observe a standing patient perform active forward shoulder abduction. The first 30 degrees of shoulder elevation should be primarily glenohumeral with minimal scapulothoracic movement. Beyond the first 30 degrees of shoulder elevation the glenohumeral and scapulothoracic joints should move simultaneously at a 2:1 ratio (180 degrees of glenohumeral motion + 60 degrees of scapulothoracic motion). Palpation of the inferior pole of the scapula and acromion may used as landmarks for measurement.

**SICK Scapula**

The acronym “SICK” scapular syndrome has been used to identify the components of scapular dyskinesis, including:

Scapular malposition
Inferior angle prominence
Coracoid tenderness/malposition
dysKinesis.
Deep Neck Flexor Endurance Test

The clinician places their flat hand on the table below the patient’s occiput. If the patient’s head begins to lower or their anterior neck skin folds separate, they are reminded to “tuck your chin and hold your head up.” The test is timed until the patient’s head touches the clinician's hand for more than one second.

The average endurance for men is about 40 seconds and 30 seconds for women. Those with neck pain average closer to 20 seconds. Low endurance suggests neck flexor weakness - resulting in an upper crossed posture and neck pain.

Neck Flexion Test

The supine patient is asked to lift their head several inches off of the table to look at their toes. The clinician observes for a “normal” movement pattern which would be initiated with a chin tuck and smooth reversal of the cervical lordosis. An “abnormal” screen would result in the chin moving forward into protraction from over compensation by the SCM. The normal firing pattern for this movement is: longus capitus, longus colli, SCM and finally anterior scalenes. Abnormal movement patterns suggest weakness of the deep neck flexors.

Shoulder Abduction Screen

The patient actively abducts their arm overhead while the clinician assesses for “normal” motion. The normal sequence for shoulder abduction is progressive firing of the supraspinatus, deltoid, infraspinatus, middle and lower trapezius, and contralateral quadratus lumborum. Patients with upper crossed syndrome frequently demonstrate early shoulder elevation (prior to 60 degrees of abduction) due to overactivity of the upper trapezius and levator scapula.

Spinal Motion Palpation

The clinician assesses the joint in all 3 planes of motion by manually challenging each segment.
Standing Postural Evaluation

This test is simply a visual assessment of posture. The ideal standing posture, when viewed from the side, is a plumb line passing through the ear, shoulder, greater trochanter, and slightly anterior to the lateral malleoli. From the back a plumb line should dissect the patient’s midline.

Empty Can Test

Patients straight arm placed at 90 degrees of elevation and 45 degrees anterior to the scapular plane. Patient points thumb down (as to empty a can). Clinician stabilizes scapula and provides downward pressure on the patient’s outstretched arm. Pain or weakness signifies possible rotator cuff pathology involving the supraspinatus. AKA Jobe Test. This test is part of the R/C Isolated Strength Test Cluster.

Hawkins-Kennedy Test

Seated patient’s arm placed into 90 degrees of forward flexion with 90 degrees of elbow flexion. Clinician stands in front and stabilizes patients scapula with one hand while gradually rotating patients arm downward, into internal rotation.

Used to assess for impingement as well as the integrity of the rotator cuff tendons and glenoid labrum.

Neer Test

Clinician stands behind patient, stabilizes the scapula with one hand and grasps the patient’s elbow with the other hand, moving their straightened arm into forward flexion until pain is reported.

Used to assess for impingement as well as the integrity of the rotator cuff tendons and glenoid labrum.
R/C Isolated Strength Test Cluster

Supraspinatus/ Empty Can:
Patients straight arm placed at 90 degrees of elevation and 45 degrees anterior to the scapular plane. Patient points thumb down (as to empty a can). Clinician stabilizes scapula and provides downward pressure on the patients outstretched arm. Pain or weakness signifies possible rotator cuff pathology involving the supraspinatus. AKA Jobe Test.

Infraspinatus & Teres Minor:
Have the patient seated with their affected arm at their side. Bend the elbow to 90 degrees and point their thumb to the ceiling. The patient should attempt to externally rotate their arm against the resistance of the practitioner. A positive test reproduces pain in the anterior/ lateral shoulder.

Subscapularis/ Lift-Off:
The patient is seated or standing and places their hand behind their back, palm facing outward, as though to tuck in their shirt in. The clinician applies resistance as the patient attempts to press their hand away from their back against that resistance. A positive test reproduces pain in the anterior/ inferior shoulder and suggests involvement of the subscapularis muscle.
Scapular Assistance Test

Patient performs active elevation of their straightened arm, in a scapular plane, until pain is felt. This is then compared to discomfort from the same maneuver when the clinician “assists” scapular motion. Assistance for the second part of this assessment is performed by the clinician grasping the patient’s scapula and rotating the inferior angle upward and laterally during arm elevation. The clinician should also pull posteriorly on the superior scapular border.

Impingement related to muscle imbalance will likely improve with “assistance”.

Scapular Repositioning Test

This test is performed with the patient consciously focusing on holding their scapula in a posterior tilted and depressed position (pushing the inferior angle of the scapula toward the spine) while abducting their arm in a scapular plane. A positive test results in improved rotator cuff strength and decreased impingement symptoms when compared to “natural” motion. A positive test suggests that scapular dyskinesis is contributing to the patient’s rotator cuff impingement symptoms.

Scapular Retraction Test

This test is a comparison between unassisted and assisted movement. First, the patient abducts their arm in a scapular plane and notes symptoms. The patient then repeats this motion while the clinician assists with retraction and posterior tilt of the scapula (pushing the inferior angle of the scapula toward the spine). Relief of impingement symptoms and increased rotator cuff strength is a positive test, suggesting that scapular dyskinesis is contributing to the patient’s rotator cuff impingement symptoms.
**Drop Arm Sign**

The clinician abducts the patient's straightened arm to 90 degrees and asks the patient to hold that position as the clinician removes their support. A positive is noted when the arm can be passively abducted by the clinician without pain, but when support of the arm is removed and the deltoid contracts suddenly, pain causes the patient to hunch the shoulder and quickly lower the arm. The drop arm sign is seen when there is pathology or a full-thickness tear of the supraspinatus tendon.

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**External Rotation Lag Sign**

With the patient seated, the clinician passively flexes the patient's elbow to 90 degrees with 20 degrees of shoulder abduction. The clinician then passively takes the patient's shoulder into a position of maximal external rotation. The patient is then instructed to hold that position. The test is positive if the patient cannot maintain this position—evidenced by retreating into internal rotation. A positive test is fairly specific and sensitive for a full-thickness tear of the supraspinatus tendon.
**R/C Tear Diagnostic Cluster**


- Age over 60
- Supraspinatus weakness (Empty Can Test)
- Weakness in resisted external rotation
- Positive signs of impingement (Neer, Hawkins)

**Rent Sign**

Palpation reveals atrophy or retraction of a muscle/ tendon, indicating possible rupture or pathology. May be seen in the supraspinatus in cases of rotator cuff rupture.
Addendum B: Rotator Cuff Exercises

**Phase I**

1. Cervical Retractions - Sit or stand looking forward with good posture. Tuck your chin to create a double chin. Hold this position for 3-5 seconds. Return to the starting position. Focus your vision on a spot on the wall to avoid neck flexion or extension. To progress, place a finger on your chin, and apply backwards pressure at end range. Imagine that your head is on drawer slides. Keep your mouth closed. Perform 1 set of 10 repetitions every hour. Alternately, this exercise may be performed standing with your back against a wall. Your buttocks and shoulder blades should be in contact with the wall. Tuck your chin to make a “double chin” until the base of your skull contacts the wall, relax and repeat as directed.

2. Deep Neck Flexion - Lie on your back, with your head supported. Perform a “chin tuck” by retracting your head to create a double chin. Lift your head, bringing chin toward your chest without lifting shoulders as though you are looking at your toes. Hold this position for 3-4 seconds. Lower your head and relax. Keep your teeth apart during exercise to decrease straining at the jaw. Perform 1 set of 10 repetitions three times a day.

3. Levator Stretch - While sitting, grasp the seat of your chair with your left hand. Rotate your head toward the right and look downward toward the floor. Place your right hand over the top of your head and gently pull down and diagonally in the direction you are looking. Against the resistance of your hand, contract your neck in an attempt to push your head backward/diagonally from the direction you are looking for seven seconds. Relax and gently pull your head further toward the floor to increase the stretch. Lock into this new position, and make sure that you continue to keep your head rotated in the direction that you are pulling. Perform three contract/relax cycles on each side twice per day or as directed.

4. Trapezius Stretch - While sitting or standing, reach down with your right arm, grasping your thigh or the bottom of a chair for stability. While looking straight ahead, place your left hand on top of your head, and gently pull your head sideways toward the left. Against the resistance of your arms, attempt to bring your right ear and right shoulder together for seven seconds. Relax and stretch further toward the left. “Lock in” to each new position, and do not allow any slack. Repeat three contract/relax cycles on each side twice per day or as directed.
5. Corner Pectoral Stretch - Begin standing, facing a corner with your palms on the walls above head level. Step toward the corner and “lean in” to stretch your chest.

6. Glenohumeral Internal Rotation - Begin sitting or standing with good posture. Place the affected arm behind your back and reach towards your opposite hip. Using the unaffected arm, gently pull the wrist of your affected arm further toward your opposite hip. A stretch should be felt in the affected shoulder. Pull gently to the point of tightness ten times. Each pull should be slow and stopped if you feel a sharp pain. This stretch should be performed for ten repetitions, once per hour or as directed.

7. Codman Pendulum - Lean over a table using the uninvolved arm for support as shown. If directed, you may hold a light weight in your hand to increase traction. Allow the involved arm to hang freely. Use your torso to swing your involved arm in a clock-wise circle for 50 repetitions. Repeat in a counter-clockwise circle for 50 repetitions. Perform 50 repetitions in each direction twice per day or as directed.

8. Cross Body Stretch - While sitting or standing, bring your involved arm across the front of your upper chest as shown in the picture. Hold the affected elbow with your uninvolved arm and gently pull across your chest until a stretch is felt in the back of your shoulder. Relax and stretch the arm further across your body. Repeat three stretches, twice per day or as directed.

Phase II

1. YTWL Scapular Depression - Stand with your straight arms raised above your head in a “Y” position. Squeeze your shoulder blades together and downward throughout the following sequence of movements. Lower your straightened arms to shoulder level, into a “T” position. Next bend your elbows so that your fingers are pointing straight up while slightly lowering your elbows to make a “W”. Finally, while keeping your elbows bent 90 degrees, lower your arms to your sides so that your elbows are touching your ribs to form an “L” on each side and squeeze. Hold each position for 1-2 seconds and repeat 3 sets of 10 repetitions, twice per day or as directed.
Addendum B: Rotator Cuff Exercises (Continued)

2. Low Row - Attach the center of an elastic exercise band to a doorknob or other sturdy object in front of you. Grasp one end of the band in each hand and with straight arms at your side, stretch the band backwards. Keep your palms facing backward and arms pointed straight down throughout the exercise. Return to neutral and repeat 3 sets of 10 repetitions daily, or as directed.

3. Brugger with Band - Begin sitting or standing with an elastic exercise band wrapped and secured around your palms. Begin with your arms at your side, elbows bent, forearm's pointing forward. Move your hands apart from each other to maximally stretch the band while simultaneously rotating your palms out, straightening your arms, and pinching your shoulder blades together as your hands move behind your hips. Return to the start position and repeat 3 sets of 10 repetitions daily, or as directed.

4. Eccentric Supraspinatus - Begin standing, holding a weight with your arm outstretched at a 45 degree angle in front of you at shoulder level. Your thumb should be pointing down. Slowly lower the weight to your thigh at a count of 4 seconds. Use your “good” arm to remove the weight from your hand and return the weight back to your “affected” hand in the starting position. Repeat 3 sets of 10 repetitions daily, or as directed.

5. Eccentric Scapular Stabilizers - Begin in a side lying position holding a weight, with your arm outstretched toward the ceiling. Slowly lower the weight to the floor at a count of 4 seconds. Carefully return your arm to the starting position by keeping it close to your body. Repeat 3 sets of 10 repetitions daily, or as directed.

6. Eccentric Shoulder ER’s - Begin in a side lying position holding a weight with your arm on your rib cage, elbow bent to 90 degrees, forearm pointing straight up. While keeping your arm on your ribs, slowly lower the weight toward the floor at a count of 4 seconds. Use your “good” arm to remove the weight from your hand and return the weight back to your “affected” hand in the starting position. Repeat 3 sets of 10 repetitions daily, or as directed.