



CLINICAL EXERCISE SPECIALIST MANUAL

A Fitness Professional's Guide
to Training People with
CHRONIC DISEASE

J. DANIEL MIKESKA DHSc

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**A FITNESS PROFESSIONAL'S GUIDE TO
EXERCISE AND CHRONIC DISEASE**

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ISBN: 978-1-946533-98-2 hardcover

ISBN: 978-1-946533-99-9 eBook

Publishing Services provided by Niche Pressworks; Indianapolis, IN

<http://NichePressworks.com>

Printed in the United States of America



CHAPTER 17

COMMON SHOULDER DYSFUNCTIONS

By the end of this chapter you will understand:

- Anatomy
- Scapular dyskinesis
- Pathologies
 - o Acromioclavicular sprain
 - o Impingement
 - o Instability
 - o Subacromial bursitis
- Treatment options
 - o Early intervention
 - o Exercise intervention
 - Mobility/stability
 - Movement
 - What to avoid

Shoulder Anatomy

In simple terms, the shoulder joint is a shallow socket housing a small ball. The shoulder complex has three bones; the clavicle, the scapula, and the humerus (Oatis, 2017). This triaxle design allows for three degrees of freedom, and eight movements; flexion, extension, abduction, adduction, horizontal

flexion, horizontal extension, internal rotation, and external rotation. The clavicle supports the upper extremity and is attached to the axis skeleton. The clavicle provides a base for muscle attachment, helps transmit force, and offers a base for shoulder stability while allowing for a range of motion (ROM) of 360 degrees. The scapula is primarily a stabilizer, but also allows for some mobility, and the proximal head of the humerus provides attachments for the four muscles of the rotator cuff (Oatis, 2019). The entire shoulder complex has four joints as detailed in Table 17.1 and Figure 17.1.

Table 17.1

Articulations of the shoulder

Joint	Articulation
Sternoclavicular	Between the manubrium of the sternum and the clavicle bone
Scapulothoracic	Between the scapula and the thorax
Acromioclavicular	Between the clavicle and scapula
Glenohumeral	Between the humeral head and the glenoid fossa of the scapula.

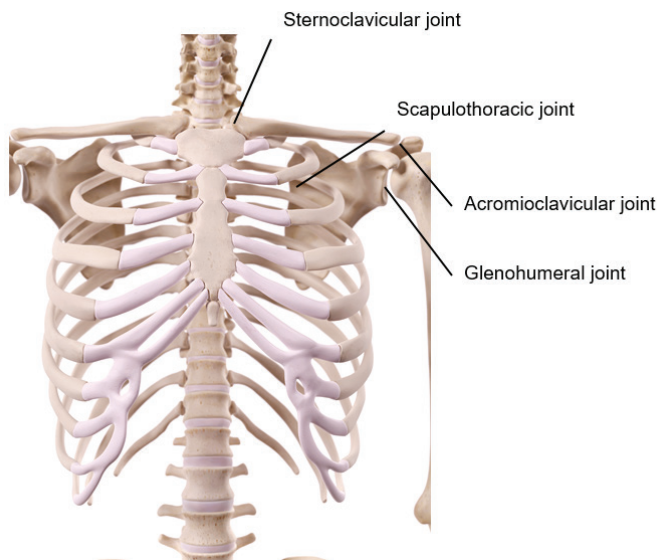


Figure 17.1 The joints of the shoulder (Shoulderdoc, 2019).

The sternoclavicular joint is formed by the medial end of the clavicle and the upper portion of the sternum, and provides 30-35 degrees of upward elevation, up to 35 degrees forward and backward movement, and 45-50 degrees of rotation (Terry & Chopp, 2000). Seventeen muscles attach to, or originate from the scapula which allows the scapulothoracic joint to provide mobility and stability to the glenohumeral (GH) joint via translation and rotation that includes (Oatis, 2017; Terry & Chopp, 2000):

- Elevation and depression
- Abduction and adduction
- Medial and lateral rotation
- Internal and external rotation
- Anterior and posterior tilt

The GH is the ball (humeral head) and socket (glenoid fossa) joint most commonly referred to as the shoulder joint, and is the most mobile joint in the human body allowing for flexion and extension, abduction and adduction, and internal and external rotation (Oatis, 2017). Mobility of the GH is controlled by supporting structures including the labrum, ligaments, and four rotator cuff muscles. The labrum is a thin rim of cartilage located around the edge of the glenoid socket that extends the socket by 5-9 mm. A damaged labrum can decrease shoulder mobility by as much as 20%, and strength by as much as 10%.

The rotator cuff is four small muscles that assist with dynamic stabilization of the glenohumeral joint: the subscapularis (not shown), the supraspinatus, the infraspinatus, and the teres minor as shown in Figure 17.2.

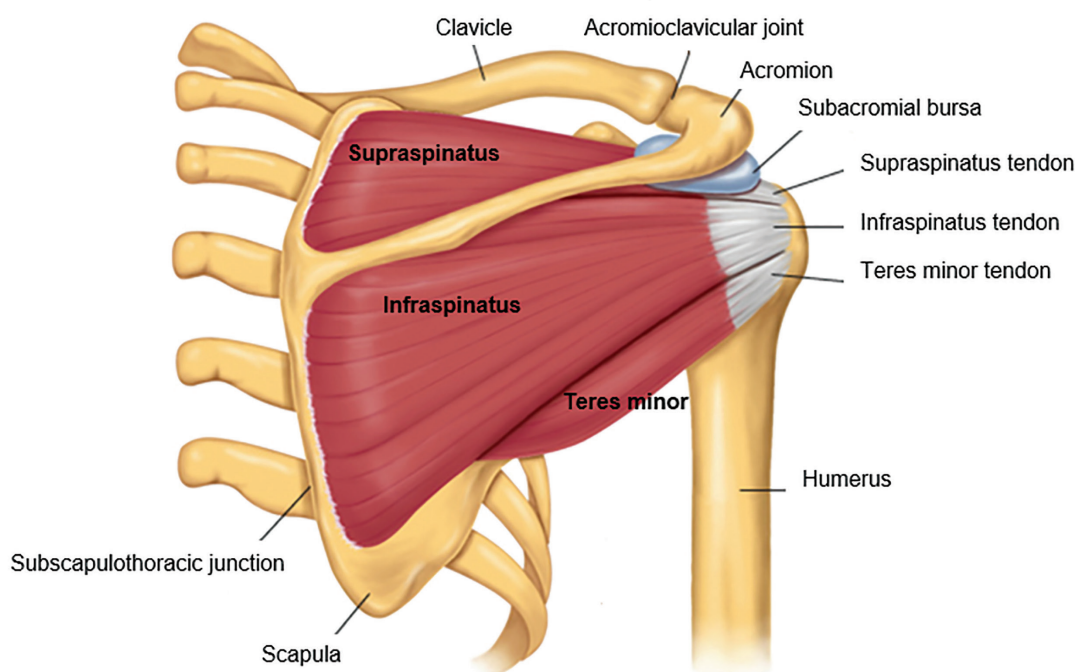


Figure 17.2 Rotator cuff and shoulder impingement

Scapular Dyskinesis

In Chapter four, Postural and Movement Assessments and Corrective Strategies, it was explained the scapula is primarily used for stabilization. Muscles that assist with dynamic stabilization of the GH joint originate from the scapula, and the scapula coordinates movement with the humerus to ensure efficient arm movements (Cools et al., 2014; Kibler et al., 2013). Scapular dyskinesis (SD) refers to altered or dysfunctional movement patterns, or the loss of normal control of the scapula (Kibler et al., 2013). Traumatic injury, neurological impairment, or muscular imbalance can cause SD. SD is characterized by scapula winging, shrugging or elevation, medial boarder prominence, or rounded shoulders. Although the exact causal relationship is unknown, SD is associated with many shoulder injuries including labral tears, rotator cuff injuries, AC separation, and multidirectional shoulder instability (Cools et al., 2014; Kibler et al., 2013; Levinson, 2015).

Altered movement patterns associated with SD can be the result of soft-tissue inflexibility and/or poor muscular performance. Overactive pectoralis minor can cause scapular and glenohumeral internal rotation and anterior tilting, similar to dysfunction associated with impingement syndrome, and chronic pain associated with overhead movements. Additionally, overactive levator scapulae, latissimus dorsi, external rotators, and rhomboids have been associated with restricted ROM of the scapula (Cools et al., 2014). Underactive muscles and muscles associated with poor scapular coordination include serratus anterior and all three sections of the trapezius, often resulting in increased shoulder elevation or shrugging during activation, and neck pain. See Table 17.2 for exercise recommendations for SD.

Table 17.2

Exercise recommendations for scapular dyskinesis

Concern	Point of dysfunction	Muscles	Stretching	Strengthening
Overactive	Scapular	Pectoralis minor Levator scapula Rhomboids	horizontal abduction and external rotation (Ts)	
	Glenohumeral	Posterior capsule Infraspinatus Latissimus Dorsi	Cross body stretch Sleeper stretch	
Underactive	Muscle strength	Serratus anterior Lower/middle traps		Low row Lawnmower Robbery
Coordination	Co-contraction Force couples			Posterior tilt and upward rotation of the thoracic spine (sternum up, head up, decrease thoracic kyphosis)

Cools et al., 2014; Kibler, Sciascia, Uhl, Tambay, & Cunningham, 2008; Levinson, 2015

Shoulder Pathologies

Shoulder separation

The acromioclavicular (AC) joint is located at the lateral border of the clavicle and the medial edge of the acromion. Due to the position and the small area of the AC joint, axial loading, such as weightlifting, heavy labor, or athletic activities can lead to joint problems, including osteoarthritis (Terry & Chopp, 2000). However, the most common mechanism for AC, or shoulder separation, are activities that often result in falling on an outstretched shoulder (Levinson, 2015; Li et al., 2014; Oatis, 2017). Most AC joint injuries are partial separation or sprains and are classified as Type I-VI as detailed in Table 17.3. Types IV-VI almost always require surgical intervention; Types I and II, and in some cases type III, may be managed without surgery.

Table 17.3

AC joint Injury and sprain classifications

Type	Characterizations	Managed without surgery
I	Stretched ligaments; no tear	Yes
II & III	Ligament tears with some deformity of the joint	Type II yes Type III varies
IV-VI	Complete tears of the AC ligaments; separation and damage to the surrounding structures	Almost never

Levinson, 2015; Li et al., 2014

Shoulder impingement

Shoulder impingement, often referred to as rotator cuff tendonitis or rotator cuff disease, has various pathologies (Ellenbecker & Cools, 2010; Escamilla, Hooks, & Wilk, 2014; Levinson, 2015). Primary impingement can occur when the supraspinatus tendon, the subacromial bursa, and the long biceps tendon (not shown) pass under coracoacromial arch (the ligament connecting the acromion and the coracoid process of the scapula [not shown]) placing the tissue at risk during shoulder flexion (Figure 17.2). Pain caused by impingement is progressive, often starting with bursitis, followed by partial to complete tears of the supraspinatus tendon, followed by damage to surrounding tissue. Impingement can also occur when the humeral head moves forward causing impingement of the supraspinatus and infraspinatus on the posterosuperior edge of the glenoid rim, leading to rotator cuff tears and labrum damage. Regardless of the mechanism of injury, shoulder impingement is usually associated with overuse, poor body mechanics, capsule laxity, and overhead motions like those performed when swimming, throwing, or in racquet sports (Ellenbecker & Cools, 2010; Escamilla, et al., 2014; Levinson, 2015). The likelihood of rotator cuff disease can also increase with age, obesity, and diabetes (Greenberg, 2014).

Subacromial bursitis

Subacromial bursitis is most often thought of as an overuse injury and can lead to rotator cuff tendonitis and impingement (Levinson, 2015). Subacromial bursitis occurs when the bursa, which sits beneath the acromion and the superior surface of the supraspinatus (Figure 17.2), and the surrounding tissue are inflamed. The inflamed tendons can rub on adjacent bone, causing tears of varying size and degree, some of which, if left unattended may require surgical intervention.

Shoulder instability

Because the AC joint is the most mobile joint in the human body, it is susceptible to anterior and posterior instability. Anterior shoulder instability can be caused by a traumatic injury, overuse, and repetitive overhead movements such as throwing a ball or swinging a racquet. Posterior shoulder instability can be caused by overzealous pushing movements and exercises such as a heavy bench press or push-ups (Levinson, 2015).

Interventions

The goal of early intervention, or phase one, is to reduce pain and inflammation, and is usually achieved by period of immobilization. Phase one also includes restoring ROM and stability, preventing or reducing muscle atrophy, and restoring proprioception (Ma et al., 2014). Accordingly, given the known association between SD and other shoulder conditions, it is not surprising restorative exercise intervention begins with scapular stability and rotator cuff strengthening, coupled with core strength and kinetic chain coordination. Movements to avoid during the initial phase of recovery for anterior instability are abduction, external rotation, and extension. Movements in the frontal plane and are encouraged; T's and Y's for example, will provide resistance, while placing little stress on the joint capsule. Movements that stress the posterior of the joint capsule, such as push-ups and bench pressing should be avoided for individuals with posterior shoulder instability, as should internal rotation with shoulder extension, as often seen in the empty-the-can exercise, as this movement may increase the chance of impingement.

Beginning stability and mobility exercises for anterior shoulder instability should consist of exercises such as planking on a stability ball, wall push-ups, and quadrupeds, as isometrics and closed chain movements will encourage stability and promote proprioception. Clients with posterior shoulder instability can perform external and internal rotation (with a band), serratus punches, or light, wide-grip bench press. Movement training can use isotonic push-ups, rowing, shoulder extension, and shrugs. Stability and mobility training for rotator cuff injuries, such as impingement, include the scapula strengthening movements used for shoulder instability, but should also include stabilization and strengthening exercises for the core, abdomen, and low back to improve proximal stability and posture. Internal and external rotation can be incorporated as inflammation is reduced. See Table 17.4 for recommended exercises for clients with shoulder instability and rotator cuff injuries.

Table 17.4

Recommended exercises for shoulder sprain and instability, and rotator cuff injuries

Dysfunction	Early intervention	Stability/Mobility	Movement	Avoid
Shoulder Sprain	Surgery Immobilization for pain control Cryotherapy Isometrics: • Abduction • Flexion • Extension • Internal and external rotation	Strengthen: • Rotator cuff • Deltoids • Pectoralis • Trapezius • Rhomboids • Latissimus Dorsi Begin with bands or very light weights and progress as needed	Functional movements to challenge the core and shoulders	Horizontal abduction and adduction Extreme scapular retraction or protraction Overhead or incline activities
Anterior Instability	A short period of immobilization Decrease pain and inflammation Restore ROM	Restore scapular stability Isometric and closed kinetic chain Plank on ball Wall push ups Quadruped—hold and stabilize Scapular dip	With scapular stability restored incorporate open kinetic chain Rowing Shrugs Serratus punch	Abduction External rotation Extension Behind the neck exercises

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Posterior Instability	A short period of immobilization Decrease pain and inflammation Restore ROM	Internal rotation External rotation	Rowing External rotation Extension Horizontal abduction	Movements that push the humeral head posteriorly into the shoulder joint such as a bench press
Shoulder Impingement	Reduce inflammation Restore neuromuscular coordination	Restore scapular stability Rowing Push-ups with scapular protraction Shrugs Serratus punch Internal rotation External rotation Incorporate low back and core exercises to progress	Shoulder flexion T-Y Flexion Abduction External rotation	Overhead activities Overhead press Incline press Lateral raises Empty the can

Cools et al., 2014; Levinson, 2015

Discussion and application

1. Describe the importance of the scapula in restorative exercises for the shoulder and provide some examples of exercises that may improve shoulder dysfunctions.

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