



the SHOULDER JOINT complex

Most therapists have at least a few clients with some sort of shoulder problem. This article is meant to give a foundational understanding of the structure and function of this intricate joint.

By Dr. Joseph E. Muscolino

The upper extremity of the human body is

created for movement. Through the combined movements of all the joints of the upper extremity, we are able to place our hand in almost any position. It can be argued that it is our unique ability to “manipulate” the world with our hands that sets us apart from the rest of the animal kingdom. Of all the upper extremity joints, the shoulder is the most mobile. In fact, it is the most mobile joint of the entire human body. As such, it is often overused and injured.

Massage therapists who work in clinical, rehab or sports settings are ideal allied health-care practitioners to deal with musculoskeletal injuries and conditions, and will often be confronted with the challenge of treating clients with shoulder joint problems. To work on these clients, a clear and thorough understanding of the structure and function of the shoulder joint is needed. Equipped with this knowledge, massage therapists can greatly increase the effectiveness of their treatment of clients with shoulder joint pathologies.

The Shoulder Joint

When we speak of the “shoulder joint,” we are usually referring to the glenohumeral joint, which is located between the glenoid fossa of the scapula and the head of the humerus. (See Figure 1, page 69.) The glenohumeral joint is the most mobile joint in our body, and is a triaxial, ball-and-socket joint that allows the arm to move in all three planes (sagittal, frontal and transverse). (See Figure 2, pages 70 and 71.) However, as mobile as this joint is, the arm rarely moves in isolation. Accompanying almost every movement of the arm is movement of the shoulder girdle. Therefore, to work on arm problems, it is important that the structure and function of the shoulder girdle are understood.

Structure Of The Shoulder Girdle

The shoulder girdle consists of two bones—the scapula and the clavicle—and motion of the shoulder girdle can occur at four joints (see Figure 3, page 72). The scapula and clavicle articulate with each other at the acromioclavicular (AC) joint, so named because the acromion process of the scapula meets the distal end of the clavicle. Although this joint does not allow a tremendous amount of motion, the AC joint is a synovial joint that allows some independent motion of the scapula relative to the clavicle. As a unit, the shoulder girdle attaches to the sternum of the trunk at the sternoclavicular (SC) joint, a synovial joint that allows the clavicle to move relative to the sternum.

Another joint exists between the anterior side of the scapula and the rib cage; this joint is called the scapulocostal. (The word “cost” refers to “rib.”) The scapulocostal joint is not a true anatomical joint because the scapula and rib cage are not joined directly to each other by connective tissue. However, motion of the scapula relative to the rib cage does occur here; therefore, it is considered to be a functional joint. The fourth joint that allows motion of the shoulder girdle is the glenohumeral joint. Although movement at this joint is usually looked at as the humerus of the arm moving relative to the scapula, the “reverse” action can occur—that is, the scapula can be moved toward the humerus.¹ While most massage therapists have a fairly solid understanding of the structure, function and related musculature of the arm moving at the glenohumeral joint, the coordination of shoulder girdle movement with arm movement at the glenohumeral joint is often not well understood.

Functions Of The Shoulder Girdle

One function of the shoulder girdle is to stabilize the upper extremity of the body by connecting it to the trunk. Other

than two muscles² that attach from the arm directly to the trunk, all connections of the arm to the trunk that stabilize the upper extremity occur via the shoulder girdle; the clavicle of the shoulder girdle then attaches to the trunk. Osseously, this attachment occurs at only one spot, the SC joint. (Remember, the scapulocostal joint is not a true osseous, anatomical joint.) Indeed, the concept of stabilization is inherent in the term shoulder “girdle.” The word “girdle” refers to an article of clothing that is worn to hold in (stabilize) the abdomen. But to stabilize effectively, girdles are supposed to completely encircle the body. The pelvic girdle of the lower extremity forms a complete circle and functions effectively as a girdle, stabilizing the lower extremity. However, the right and left shoulder girdles do not completely encircle the body. Although anteriorly they may be considered to be skeletally connected via the sternum, posteriorly, they have no skeletal connection. The scapulae posteriorly are only connected to each other indirectly by soft tissue musculature. As one of my students once pointed out, the shoulder girdles show more similarity to a corset than they do to a girdle.³

Stabilization of the upper extremity is one function of the shoulder girdle. The other function of the shoulder girdle—movement—is equally important. Movement of the shoulder girdle can occur as a whole—that is, the scapula and clavicle can move together as one unit. As mentioned, movement of the shoulder girdle can occur relative to the sternum at the SC joint, relative to the rib cage at the scapulocostal joint and relative to the arm at the glenohumeral joint. Movement within the shoulder girdle also can occur; independent motion of the scapula relative to the clavicle may occur at the AC joint.

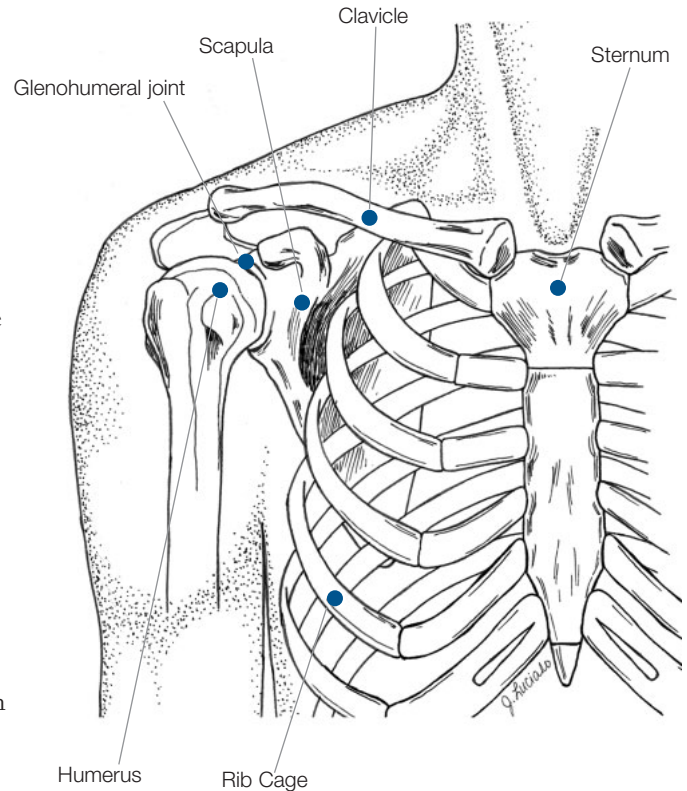


Figure 1.

The glenohumeral joint (the “shoulder joint”) is located between the glenoid fossa of the scapula and the head of the humerus.

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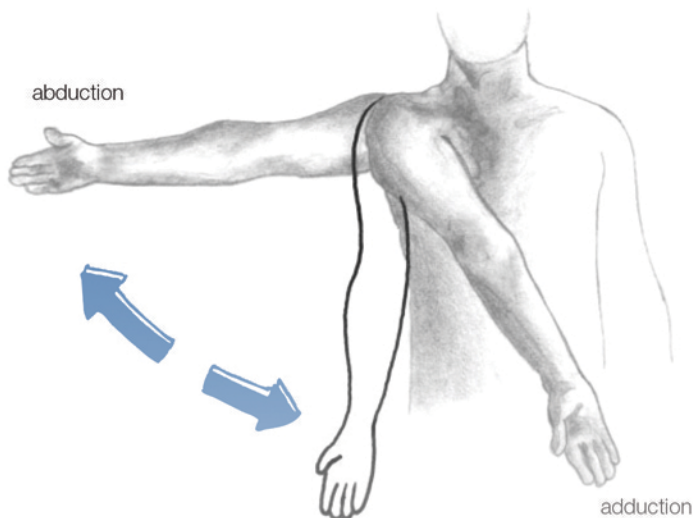
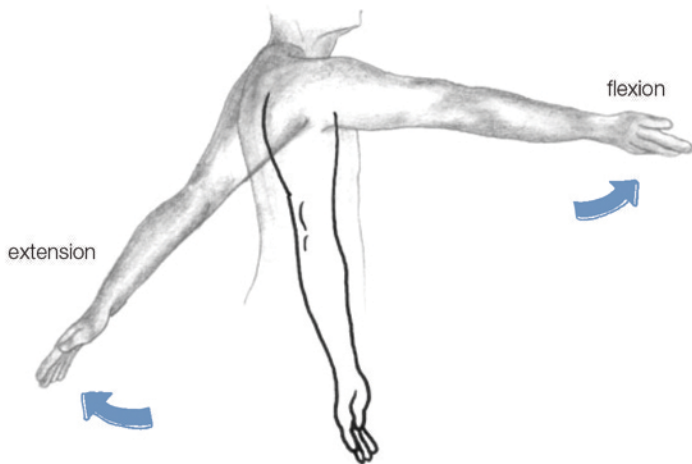


Figure 2a. (Top)

This illustrates the sagittal plane movements of flexion and extension of the arm at the shoulder joint.

Figure 2b. (Bottom)

This illustrates the frontal plane movements of abduction and

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Additionally, when the humerus moves, the shoulder girdle also must move. This motion occurs as both movement of the shoulder girdle as a unit, as well as motion within the shoulder girdle. Thus, when discussing shoulder movement, we must consider the arm and the shoulder girdle together.

Therefore, we see that the “shoulder joint” is actually a complex of joints. For this reason, the term “shoulder joint complex” is a more accurate term to use when looking at how the shoulder functions. The joints of the shoulder joint complex must work together in a smooth and coordinated manner for full and proper stabilization of the upper extremity, and for full and proper movement of the upper extremity. The term that is used to describe this coupled movement of the arm with the shoulder girdle is “scapulohumeral rhythm.”*

Scapulohumeral Rhythm Of The Shoulder Joint Complex: Abduction Of The Arm

It is not possible for us to comprehensively cover the interrelationship between the arm and the shoulder girdle for every motion of the shoulder joint complex. Instead, we will look at one motion as an example—abduction of the arm at the glenohumeral joint—and examine the role that the shoulder girdle has in this motion. Looking at an individual that abducts his or her arm at the shoulder joint, it seems that the range of motion is 180 degrees. (See Figure 4, page 73.)

However, not all of this motion is the arm abducting relative to the scapula at the glenohumeral joint. Of the 180 degrees of apparent motion, only 120 degrees of this movement occur as a result of the arm abducting at the glenohumeral joint itself. The remaining 60 degrees are due to movement of the scapula relative to the rib cage; this movement of the scapula is upward rotation of the scapula at the scapulocostal joint. Hence, of the 180 degrees of arm movement relative to the trunk, 120 degrees occur with the arm abducting relative to the scapula at

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