

*Yang Chengfu's Ten Essentials insured that the practice of Tai Chi Chuan would improve people's health. It is impossible to overstate the importance of these Ten Essentials in identifying the elements that make Tai Chi Chuan a healthful practice. Without the Ten Essentials, it is doubtful that Tai Chi Chuan would be recognized all over the world as a unique exercise system that offers special benefits to those who practice it.*

# LOOKING THROUGH THE LENS OF SCIENCE AT THE TEN ESSENTIALS OF TAI CHI CHUAN

## PART 6

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### PART VI

**Looking at: “Chen zhui jian zui zhou”, “Sink the shoulder and droop the elbows”**

To understand this principle, we have to begin with the basic anatomy of the arm structure at the shoulder.

There is one joint that connects all the bones of the arm structure to the rest of our body: the sternoclavicular joint (Figure 1, circle a).

This joint is located on the top of the sternum (breastbone). From this joint, the clavicle extends outward and meets the acromium (the raised ridge of the scapula (shoulder blade)). The meeting of these two bones form the second joint of the shoulder area, the acromioclavicular joint (Figure 1, circle b). The third joint we encounter is the glenohumeral joint (shoulder joint) which is formed by the rounded head of the humerus (long bone of the upper arm) resting against a depression on the outer edge of the scapula, the glenoid fossa (Figure 1, circle c).

Looking at the bones in the shoulder area, we can discern the job that each one does:

The clavicle holds the arm structure away from the body, the scapula provides muscle attachments that provide strength to the arm and connection to the rest of the body, the glenohumeral joint (shoulder joint) allows 360 degrees of freedom in the movement of the arm.

The clavicle, in holding the arm away from the body in the rib area, fulfills two important functions. One is protective. The clavicle gives our bodies a “crumple zone”, to borrow a term from automobile designers. When we fall, the shoulder area is frequently the area of impact. The clavicle transfers the force of the fall across the top of the rib cage, absorbing energy and thus helping to prevent damage to the bones of the ribs and injury to the vital organs. If the fall is hard, the clavicle will sometimes break to dissipate the force that would otherwise damage the rib cage.

The other essential function of the clavicle is providing clearance for the glenohumeral joint. Without the clavicle, the shoulder joint would not be able to clear the rib cage and rotate with 360 degrees of freedom.

The scapula provides many surfaces for muscle attachments. Through these attachments, the arm structure is linked to the head, the rib cage, the vertebral column, and the pelvis. It is the position of the scapula, relative to the head and the rib cage, which creates the posture of the shoulder joint. The movement of the scapula raises, lowers, tilts, pulls back, or pulls forward the location of the shoulder joint relative to the rest of our body. The muscles that attach to the scapula are some of the most massive in our body. We can hang our entire body from one arm or do a handstand because of the power that is provided by the scapular muscles.

The glenohumeral joint, by contrast, is not built for power but

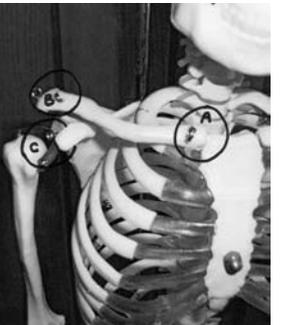
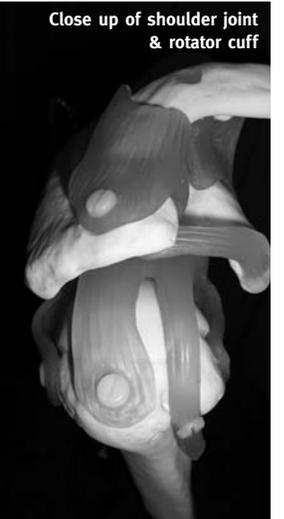


figure 1



Close up of shoulder joint & rotator cuff

for precision and range of movement. The muscles of the “rotator cuff” that guide movement at the shoulder joint are positioned in a way that is similar to the muscles that attach to the sphere of our eyeballs and allow our eyes to gaze in a 360 degree range. The design of the rotator cuff gives the glenohumeral joint (close up, pg.10) enormous flexibility. However, the rotator cuff is vulnerable to injury particularly when the rounded head of the humerus is pushed upward, in other words, when the shoulder joint is not sunk. This type of injury can happen when we fall onto our hand when our arm is stretched out with the elbow locked or when our arm is forced backward when it is raised up or when the shoulder joint is forced forward when the arm is held back (as in “rollback”).

Now that we have a basic knowledge of the anatomy of the arm structure, we can understand how to “sink our shoulders”. We know that to “sink the shoulder” we have to move the scapula in some way because it is the scapula that determines the posture of the shoulder joint.

In order to “sink the shoulder”, it is important to know what raises up the shoulder joint and prevents us from sinking it. The posture of your head affects the posture of your shoulder joint because of the many muscle attachments that connect the arm structure to the head. When your head is held forward of your body, (notice the position of your head relative to your body as you are reading this journal article!), your scapula will be pulled up and forward toward the top of your ribs. This raises up and tilts your shoulder joint forward, making it impossible to “sink” it (Figure 2a).

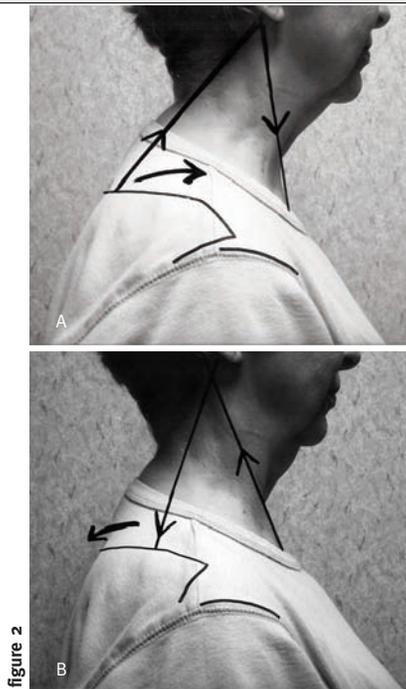


figure 2

A more upright head posture (Figure 2b) will allow the scapula and shoulder joint to maintain a lower posture.

Next, we have to consider the muscles that can pull the scapula downward and thus lower the posture of the shoulder joint. Figure 3a diagrams the action of the pectoralis minor muscle with black arrows. This muscle pulls

the scapula downward, forward, and in towards the ribs. We can feel the action of this muscle if we place the palm of our hand on our breastbone and let the fingers rest against our chest, reaching diagonally upward with the middle finger touching the caracoid process of the scapula – the bony “hook” we can see below “b” and beside “c” in Figure 1. With our hand in this position, Figure 3b, we can feel the action of this muscle if we tighten it to pull the shoulder joint down and forward relative to the front of our rib cage.

Looking at Figure 4a, we see arrows that represent the line of action of the serratus anterior muscle. This muscle attaches to the inner surface of the scapula (the side that lies against the back of the rib cage) and reaches forward to connect to the first eight or nine ribs toward the front of the rib cage. This muscle is

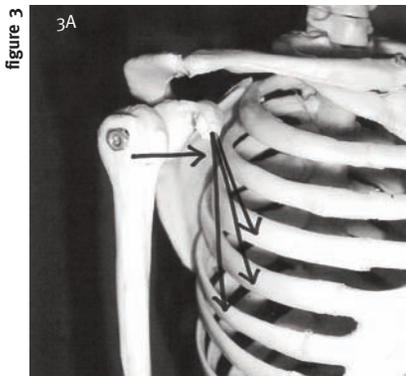


figure 3

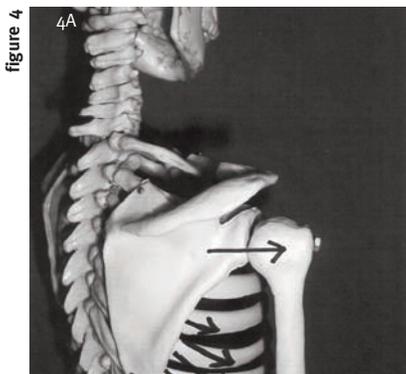


figure 4



figure 5

figure 6

easy to see on athletes who have developed great upper body strength, like boxers or gymnasts. If you look at the sides of their rib cage, serratus anterior looks like fingers reaching around and down toward the abdominal “six pack” muscles. When we activate this muscle, we can feel the lower edge of our scapula sliding diagonally down and forward, Figure 4b.

The serratus anterior pulls the scapula from the back of our bodies toward the front, rotating the scapula slightly as its lower edge is pulled forward and down along the curve of the rib cage. As the scapula rotates, the shoulder joint is moved slightly outward, abducting the arm away from the body, which preserves the mobility and freedom of the glenohumeral joint.

Since discussion of the principle states that “sinking the shoulders” means the shoulders “relax open and hang downward”, the action of the serratus anterior muscle combined with upright head posture would seem to fulfill the requirement. Of course, in any action, many muscles contribute, so we are referring to the primary mover or line of action where we would focus our intention as we strive to fulfill the principle.

The action of the pectoralis minor muscle also lowers the shoulder joint but it closes the arm toward the ribs rather than opening the arm. If we compare Figure 5a and Figure 5b, we see

“sink the shoulder” using two different intentions. In Figure 5a, the intention is through the pectoralis minor muscle and in Figure 5b, the intention is lead through the serratus anterior muscle. In both photos, the shoulder joint is lowered. In 5a, the joint is also pulled in toward the body, or closed. In 5b, the joint is slightly abducted, or open. It would seem that Figure 5b illustrates an intention that is following the principle more accurately because it includes a concept of opening.

The position of the elbows is also mentioned the principle, chen zhui jian zui zhou. The elbows should be “dropped” or “drooped”. Again, we look to the study of anatomy to discover how elbows can be drooped while the arm is lifted up.

The orientation of the elbow joint, whether the elbow is pointed downward or outward or upward or inward, is determined by the rotation of the humerus, the long bone of the upper arm. Rotation of the arm bone calls into play the mighty latissimus dorsi muscle, diagramed in Figure 6. This muscle is the primary link between the arm structure and the waist area. Without the action of the latissimus dorsi, there would be no way to transfer energy from the waist to the hands. “Drooping” the elbows requires rotation of the humerus, this action engages the latissimus dorsi, and connects the arm structure to the waist. The

action of this muscle also draws the arm structure downward and backward, balancing the action of the serratus anterior which pulls the shoulder joint downward and forward. This forward and backward “dance” between the latissimus dorsi and the serratus anterior muscles give the feeling that the shoulder joint is being moved from below rather than from above, in other words, the movement of the joint is “sunk”.

In summary, to fulfill this principle we have to keep in mind a few points:

- 1 The position of our head will affect our ability to sink our shoulders.
- 2 Our shoulder joint is lowered by moving our scapula.
- 3 It is important to keep our shoulder joint open when we sink it to retain flexibility in our shoulder joint.
- 4 Sinking the shoulder joint protects us from injury.
- 5 By rotating our elbows downward, we connect our arms to our waist area.\*

\*(Even when our arm is raised over our head, as in “White Crane Separates Its Wings”, we can still “drop” the elbow by rotating our upper arm, and then we will feel the connection of our arm to our waist area. In this posture, it is also easy to feel the action of the serratus anterior muscle, pulling the lower edge of our scapula down and forward along the ribs to sink the shoulder joint. If we place our left hand under our right shoulder joint as we maintain the right arm posture of “White Crane Separates Its Wings” and alternately relax and activate our serratus anterior muscle we can feel the lower edge of our scapula move forward and back along the side of our ribs.)