Body Mechanics

by Joseph E. Muscolino | Art Giovanni Rimasti | Photography Yanik Chauvin

The Price of Smart Phones

TEN COMMON DYSFUNCTIONAL POSTURES AND INJURIES CAUSED BY SMART PHONE USE

The introduction of any new technology often comes with unexpected consequences. This is certainly true with widespread use of the smart phone. Although the smart phone is a wonderful marvel of communication that allows us to be connected with our loved ones, friends, and business colleagues, as well as connect us to the internet and therefore the world around us, unfortunately it comes at a price. That price is the physical stress that it can place on our body. One only needs to go to a public place and observe others while using their smart phones. The odds are that we will see many dysfunctional postural patterns and future injuries in the making. However, most of these conditions can be avoided if we pay attention to our biomechanics as we hold and use the smart phone.

As therapists, it is important to be aware of these common conditions so that we can be prepared to assess for them, and if found, provide the appropriate clinical orthopedic work to ameliorate the condition. Being aware of these potential problems also arms us with the knowledge needed to be able to offer the client valuable postural advice about how to properly hold and use the smart phone so that the development of these problems can be avoided.

Following are ten of the most common dysfunctional postural patterns and injuries that may occur with smart phone use. Some of these conditions are purely postural and can be avoided by improving the posture that is employed when using a smart phone. Other conditions may better be described as repetitive overuse conditions. However, even with repetitive overuse conditions, improving smart phone posture can help to minimize or avoid their onset. For these reasons, some suggested postures for smart phone use are offered at the end of this article.

1 GOLFER'S ELBOW

Golfer's elbow, also known as medial epicondylitis or medial epicondylosis, is a condition in which inflammation and/or degeneration of the common flexor tendon occurs, usually accompanied by hypertonicity of the bellies of the associated muscles. This condition is caused by overuse of the muscles of the common flexor tendon that attach to the medial epicondyle of the humerus. These muscles are the three muscles of the wrist flexor group (flexor carpi radialis, palmaris longus, and flexor carpi ulnaris), the pronator teres, and the flexor digitorum superficialis. As a whole, these muscles do flexion of the wrist joint and the fingers; in other words, the joint actions necessary to grip and hold any object including a smart phone (Figure 1). Holding the smart phone occasionally for a few minutes at a time is not a problem. The problem occurs with overuse that requires prolonged isometric contraction of the associated musculature, leading to fatigue and eventual injury/dysfunction of the common flexor tendon. The development of this condition is accelerated if the client grips the smart phone harder than necessary, thereby increasing the contraction strength and therefore stress upon the musculature and its common tendon.

2 TENNIS ELBOW

Tennis elbow, also known as lateral epicondylitis or lateral epicondylosis, is a condition in which inflammation and/or degeneration of the common extensor tendon occurs, usually accompanied by hypertonicity of the bellies of the associated muscles. This condition is caused by overuse of the muscles of the common extensor tendon that attach to the lateral epicondyle of the humerus. These muscles are the ex-

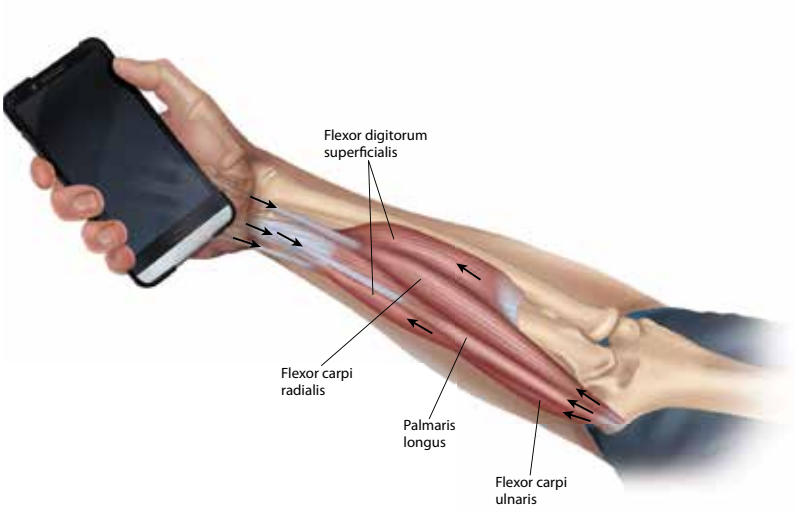

Figure 1. Prolonged holding of a smart phone can lead to overuse, fatigue, and dysfunction of the common flexor tendon. This condition is known as golfer's elbow.

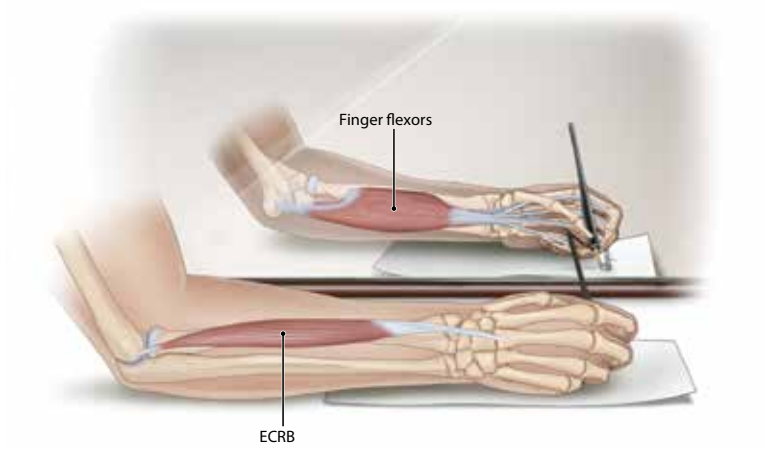

Figure 2. Prolonged holding of a smart phone (or pen as seen here) can lead to overuse, fatigue, and dysfunction of the common extensor tendon. This condition is known as tennis elbow.

Figure 3. Crimping a smart phone between the shoulder and ear physically stresses muscles of scapular elevation.

tensor carpi radialis brevis, extensor digitorum, extensor digiti minimi, and the extensor carpi ulnaris. As a group, these muscles do extension of the wrist joint and the fingers. It would seem that these muscles do not need to contract when gripping and holding a smart phone because this activity requires contraction by flexion musculature, not extensor musculature. However, extensor musculature is needed to contract isometrically to stabilize the wrist joint and prevent it from flexing when the flexors digitorum superficialis and profundus muscles contract to flex the fingers. Most often, it is the extensor carpi radialis brevis (ECRB) that engages in this scenario (Figure 2). Therefore, holding a smart phone does physically stress musculature of the common extensor tendon and can contribute to tennis elbow. Occasional use is not a problem; like golfer's elbow, tennis elbow is an overuse condition. Gripping the phone more forcefully than necessary will also increase the stress to the extensor musculature and therefore the likelihood that this condition will develop.

> "It is wise to take a break from your smart phone every few minutes so that you can move and change your posture."

3 UPTIGHT SHOULDERS

Developing "uptight" elevated shoulders with a smart phone occurs when the phone is crimped (compressed) between the ear and shoulder, because this posture requires contraction of scapular elevation musculature to bring the shoulder up to hold the phone against the ear (Figure 3). Muscles of scapular elevation that are used/overused and likely to become fatigued, tight, and injured are the upper trapezius and levator scapulae. Crimping a phone also requires contraction of same-side lateral flexion musculature of the neck to help press the ear downward against the phone and shoulder. This further requires contraction of, and therefore physically stresses, the upper trapezius and levator scapulae, as well as other muscles of lateral flexion. This problem is not new with smart phones. It was and still is common for people to crimp landline phones too. However, because smart phones are much smaller, the amount of muscular effort necessary to crimp a smart phone is greater than to crimp a landline phone.

4 ANTERIOR SHOULDER STRAIN

It is common for people using a smart phone to hold the phone in the air out in front of their body. The difficulty with this posture is that it requires isometric contraction of the musculature of humeral flexion at the glenohumeral joint to hold the arm out in the air. Foremost among these muscles is the anterior deltoid (Figure 4). Holding the arm out in flexion also requires stabilization of the scapula, which requires contraction of and therefore stress to the upper trapezius. And if the person also adds in elevation of the shoulder girdle to hold the phone up higher, it places even greater stress on the upper trapezius, as well as the levator scapulae. Therefore, excessive engagement of this posture can lead to anterior deltoid strain as well as strain of the upper trapezius and levator scapulae.

Figure 4. Holding the phone out in front of the body can overly stress, fatigue, and injure musculature of the anterior shoulder.

5 ROTATOR CUFF STRAIN/TENDINITIS

Holding a phone out in front of the body with humeral flexion can also stress and injure the rotator cuff musculature. Whenever the arm is lifted upward in the air, whether it is up into flexion, extension, abduction, or adduction, it is necessary for the rotator cuff musculature to contract to stabilize and hold the (proximal) head of the humerus down into the glenoid fossa as the distal end of the humerus raises (Figure 5). Overuse of this posture can, over time, contribute to fatigue, tightening, strain, and tendinitis of the rotator cuff muscles.

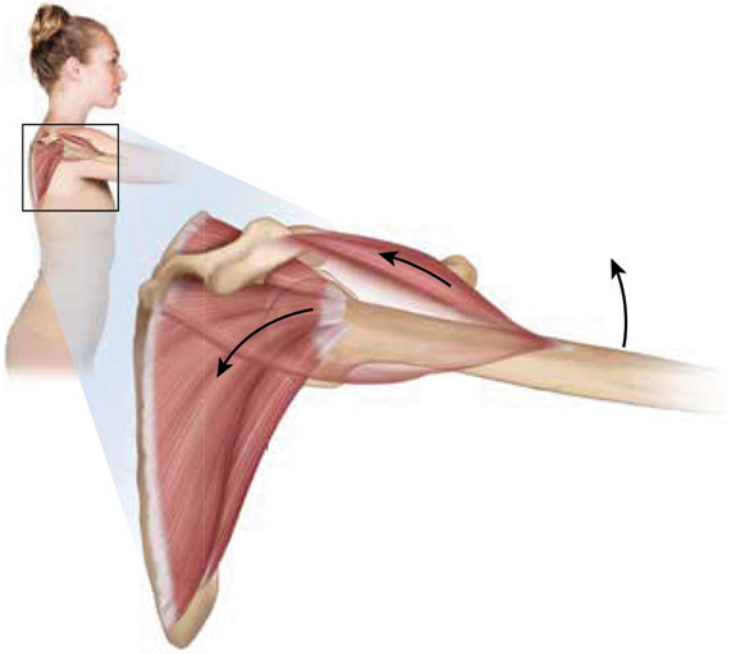

Figure 5. Holding the arm out in front of the body can also physically stress, fatigue, and injure musculature of the rotator cuff group.

6 ROUNDED SHOULDERS

Rounded shoulders is a postural distortion pattern in which the scapulae are protracted and the humeri are medially rotated. Therefore the shoulder girdles and arms are rounded in, hence the name. The client with rounded shoulders has scapular protractors (pectoralis minor and major) and humeral medial rotators (subscapularis, pectoralis major and teres major) that are locked short and tight, accompanied by scapular retractors (middle and lower trapezius and rhomboids) and humeral lateral rotators (teres minor and infraspinatus) that are weak and also likely locked long and tight. Using a smart phone often predisposes the client to this condition because so many people hold the smart phone down low in front of them (Figure 6). As with other over-