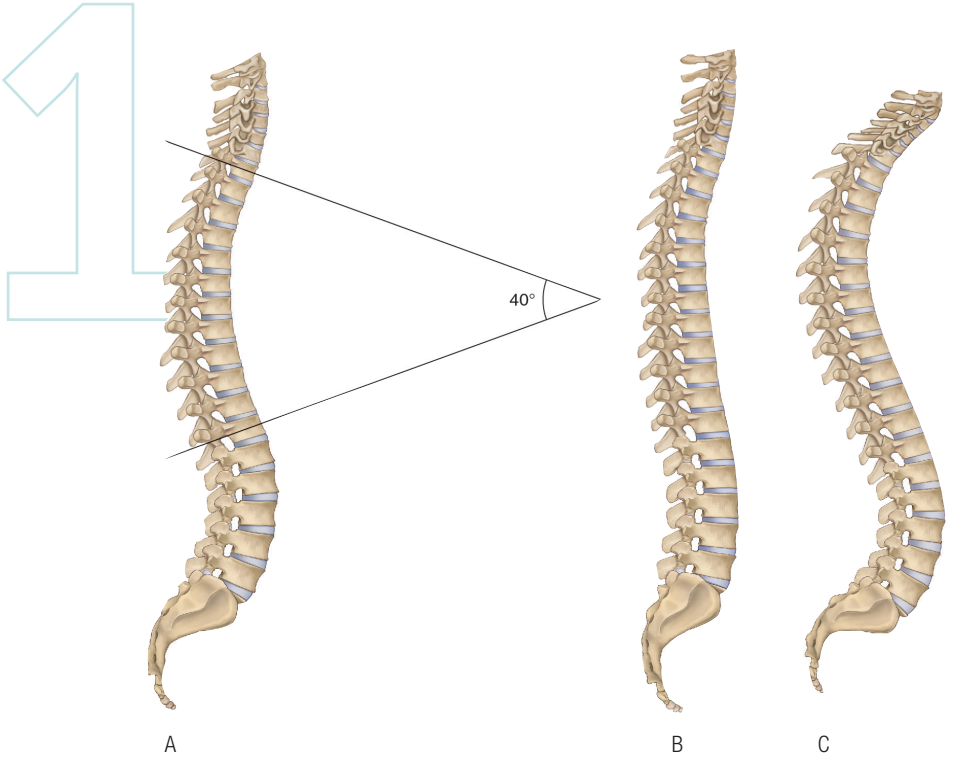
Thoracic Spine

The Silent Saboteur

By Joseph E. Muscolino, DC

There is a saying

that no posture is bad unless you get stuck in it. The problem is that people often *do* get stuck in bad postures. And this is especially true for the thoracic spine. Postural distortion of the thoracic spine, even when advanced, is often asymptomatic and, therefore, ignored by the client, but can be a major cause of other postural distortion and pain patterns in the body. In this way, the thoracic spine could be viewed as a silent saboteur of our health. The client may not even mention the thoracic region when describing her problem, but we need to always consider and assess the thoracic spine when evaluating our clients' health.



Healthy, natural kyphosis of the thoracic spine measures approximately 40 degrees (A). Hypokyphotic thoracic spine (B). Hyperkyphotic thoracic spine (C). *Reproduced with permission from Joseph E. Muscolino. Artwork by Giovanni Rimasti.*

Postural distortion of the thoracic spine is rarely seen by the client himself, as it requires an assessment from the side to determine the actual degree of kyphotic curvature.

ROUNDED BACK

A healthy thoracic spine should have a natural kyphotic curve that measures approximately 40 degrees (Image 1A). Although it is possible for this curve to be abnormally decreased (hypokyphotic, Image 1B), by far, the more common postural distortional pattern is for the thoracic spine to become hyperkyphotic (Image 1C). In lay terms, this is often described as *rounded back*.

A kyphotic curve is effectively a curve of flexion, so it makes sense that having a forward-flexed posture on a regular basis would lead to a hyperkyphotic, or hyperflexed, rounded thoracic posture. In addition, most everything we do in our modern world happens down in front of us—whether it is tending to a baby, cleaning a counter,

Working down in front of our body tends to promote a hyperflexed (hyperkyphotic) rounded thoracic spine. *Reproduced with permission from Joseph E. Muscolino. Artwork by Giovanni Rimasti.*

cutting vegetables, doing paperwork, or working with a laptop, tablet, or smartphone (Image 2). Working down in front of our body is not new, but with the tremendous proliferation of digital devices, the number of hours people spend hunched forward into flexion has increased exponentially. Indeed, it seems that hyperkyphosis of the thoracic spine is becoming more prevalent, and may now be the most common and problematic postural distortion pattern that manual and movement therapists encounter.

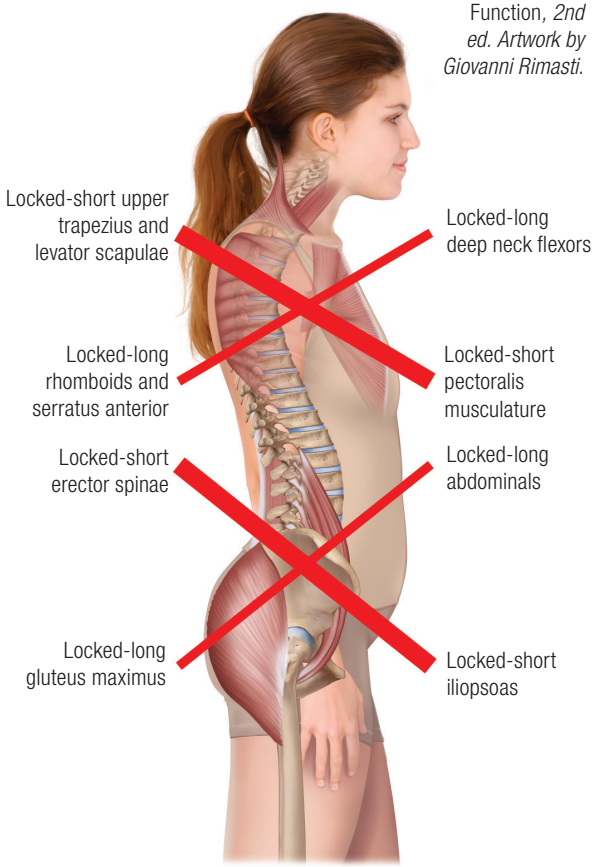
Like any postural distortion pattern, the longer we assume a rounded-back posture, the more the soft tissues adapt to the distortional pattern. With a rounded thoracic spine, the anterior pectoral musculature ends up shortening and tightening and the posterior spinal extensor musculature ends up lengthening and tightening in response (see "Locked-Short/Locked-Long" on page 77). Further, the anterior fascial/ligamentous tissue shortens and becomes taut and the posterior fascial/ligamentous tissue lengthens and weakens, thereby losing the tautness or tone to oppose the forward flexion. As the fascial tissue weakens, this increases the burden on the extensor musculature, which becomes further overwhelmed and dysfunctional in its attempt to prevent the forward progression.

As we move further into flexion, our center of weight moves anteriorly, increasing the leverage force of gravity, which furthers the force toward a forward-flexed posture. Additionally, staying stuck in a rounded-back posture also allows the buildup of fascial adhesions (often described as "fuzz" by educator Gil Hedley; watch Hedley's "The Fuzz Speech" at www.youtube.com/watch?v=_FtSP-tkSug) that further resist the body from moving back into extension. When this posture is extremely long-standing, for years or decades, even the bones remodel. The anterior aspects of the vertebral bodies narrow in height in response to the increased weight-bearing anterior compression force.

All these factors add up to a postural distortional pattern that, once set in motion, tends to become a vicious cycle that feeds on itself, steadily and progressively worsening. So, what begins as a seemingly innocuous voluntary forward posture that we pay little attention to, often transitions into a stubborn, rigid, dysfunctional pattern in which we become stuck. This pattern alters the health of the thoracic spine, and indeed, much of the rest of the upper body.

UPPER-CROSSED SYNDROME (UCS)

A rounded thoracic spine does not exist in isolation. Rather, it is usually part of a larger dysfunctional pattern that involves the neck, head, shoulder girdles, and arms. This larger pattern is often described as *upper-crossed syndrome* (UCS) and is so named because a cross (X) can be placed across the upper body. One arm of the cross represents overly facilitated (locked-short) musculature; the other arm represents overly inhibited (locked-long) musculature. The effect of the imbalanced asymmetrical pulls of the musculature results in the characteristic UCS posture, which involves hyperkyphosis of the thoracic spine, hypolordosis of the lower cervical spine, hyperlordosis of the upper cervical spine, forward-head carriage, protraction of the shoulder girdles, and medial/internal rotation of the arms at the glenohumeral joints (Image 3). Even though each of these postural distortions can be viewed as a separate entity, in reality, each one tends to increase the dysfunction of the others. However, the rounded-back thoracic hyperkyphosis is most fundamentally the root cause of the UCS pattern.



Upper-crossed syndrome. *Reproduced with permission from Joseph E. Muscolino.* Kinesiology: The Skeletal System and Muscle Function, *2nd ed. Artwork by Giovanni Rimasti.*

Locked-Short/ Locked-Long

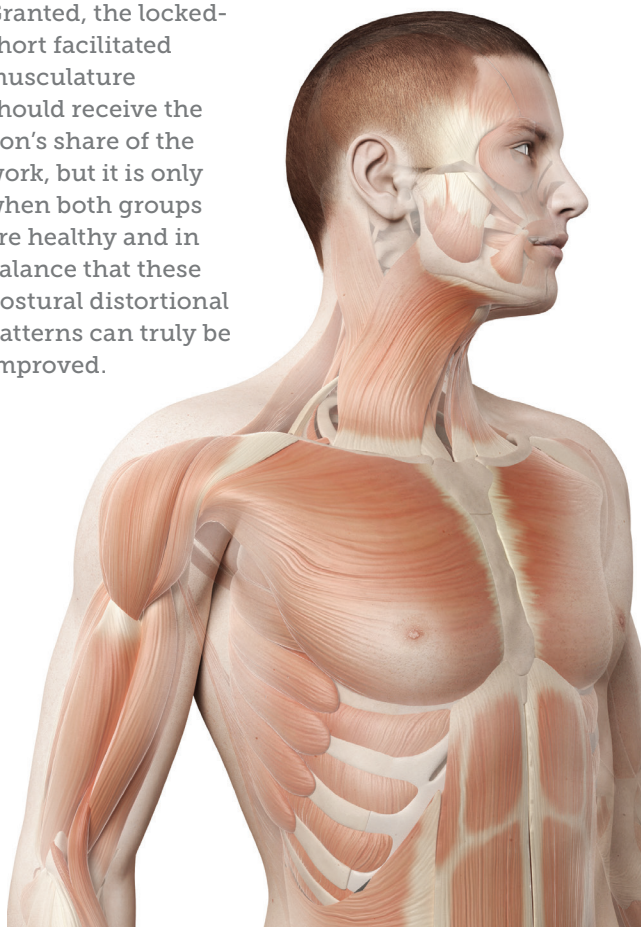
When evaluating postural distortional patterns in the past, opposing muscle groups at a joint were classically described as being *tight* and *weak*. The assumption was that tight muscles were strong and weak muscles were loose, so the imbalance of bony posture at a joint was described as being caused by strong/ tight muscles on one side of the joint overpowering weak/ loose muscles on the other side. It is now understood this description does not fully and accurately describe the state of the relationship of these muscle groups to neuro-myo-fascio-skeletal posture and function.

Current wisdom favors the use of the terms ***overly facilitated*** and ***overly inhibited*** muscles. These terms incorporate the role of the nervous system in recruiting musculature to contract for postural patterns. Overly facilitated muscles are excessively favored by the nervous system to contract; and overly inhibited muscles are under-recruited by the nervous system to contract. The facilitated muscles end up overly concentrically contracted and short; the inhibited muscles are overpowered by the facilitated muscles and end up being pulled long. This results in the imbalanced pull across a joint and the resultant altered posture.

Certainly, the overly facilitated muscles can be described as tight. But it is not accurate to describe the inhibited muscles as loose. Ironically, because of the constant pull by the overly *facilitated* musculature, the overly *inhibited* musculature must increase its tone in an attempt to counter the effects, and ends up being, in a sense, tight and overly facilitated itself. Hence we have two opposing muscle groups: the tight and short facilitated muscles, *locked-short*; and the tight and long inhibited muscles, *locked-long*.

Because the length-tension relationship of muscle strength demonstrates that a muscle is strongest at resting length and weaker when it is longer or shorter, we can say both groups of muscles across the joint are overly weak. The inhibited musculature might be relatively weaker than the facilitated musculature, but in reality, both groups are weak. Effectively, we have tight and weak musculature on both sides of the joint. A classic example of this is the anterior pectoral musculature (locked-short; tight and weak) and the posterior shoulder girdle retractor and thoracic spinal extensor musculature (locked-long; tight and weak).

When applying this knowledge to manual therapy, we see that it is valuable to work the overly facilitated and the overly inhibited musculature because both groups are dysfunctionally tight and weak and are, therefore, likely to develop myofascial trigger points and fascial adhesions. This is important to recognize because there are many manual therapists who assert that only the locked-short musculature should be worked, likely because they feel that the opposing long musculature is already weak and would become even weaker if it were to be massaged and stretched. This is a fallacy. Manual therapy applied to any dysfunctional musculature, locked-short or locked-long, helps to restore the proper health and function of the musculature. Granted, the locked-short facilitated musculature should receive the lion's share of the work, but it is only when both groups are healthy and in balance that these postural distortional patterns can truly be improved.



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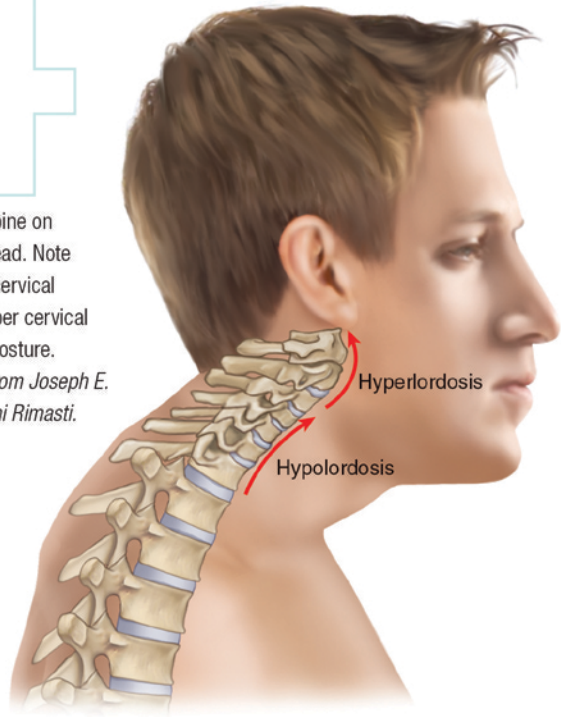

Effect of a rounded thoracic spine on the posture of the neck and head. Note the hypolordosis of the lower cervical spine, hyperlordosis of the upper cervical spine, and the forward-head posture. *Reproduced with permission from Joseph E. Muscolino. Artwork by Giovanni Rimasti.*

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Rounded thoracic spine also leads to protracted scapulae and medially rotated humeri. *Reproduced with permission from Joseph E. Muscolino. Artwork by Giovanni Rimasti.*

EFFECT ON THE CERVICAL SPINE

Once we flex the thoracic spine forward, the cervical spine must begin its posture on the superior aspect of the body of T1 that is now more vertically oriented. This projects the lower neck anteriorly, continuing the path of the upper thoracic spine, causing the lower cervical spine to be hypolordotic. As a necessary compensation, the upper cervical spine must become hyperlordotic to bring the eyes and inner ears level for proprioception (Image 4). These dysfunctional cervical postures alter the balance of weight-bearing through the cervical spinal joints. Hypolordosis increases weight-bearing through the discs, increasing the likelihood of disc pathology. Hyperlordosis increases weight-bearing through the facets, increasing the likelihood of facet irritation and degenerative osteoarthritic changes. These conditions, in turn, increase the likelihood of nerve compression in the intervertebral foramina.

EFFECT ON FORWARD-HEAD CARRIAGE

This altered cervical posture also results in a forward-head carriage, in which the center of weight of the head is located anterior to the trunk, over thin air (Image 4). This imbalanced posture requires the posterior soft tissues to work harder to keep the head from falling into flexion due to gravity, resulting in tighter posterior extensor cervicocranial musculature, likely causing neck pain, myofascial trigger point referral pain, and tension headaches.

EFFECT ON SHOULDER POSTURE

Once the thoracic spine rounds forward, the shoulder girdles cannot maintain a posterior posture and they fall into protraction; the arms follow and begin falling into medial (internal) rotation (Image 5). These

To experience the effects of this rounding, first try abducting and/or flexing your arm with it being medially rotated. Then, repeat the motion with the arm laterally rotated, and note the difference in range of motion. A medially rotated arm also increases the likelihood of shoulder impingement syndrome of the supraspinatus tendon and