Strategies to Address
FORWARD-HEAD POSTURES
Part Two: Bringing the Body Back into Balance
by Erik Dalton

Often seen as a structurally subtle body segment, the neck is burdened with the challenging task of supporting and moving the human head. Because of the tension, trauma and poor postural habits inherent in today’s workplace, it is no surprise that head-on-neck and neck-on-thorax disorders rank high among the most common pain generators driving people into bodywork practices.

This two-part series is excerpted from the author's new textbook, Advanced Myoskeletal Techniques. Part One examined the causes, conditions and corrections for one of the most prevalent and painful of all structural disorders: forward-head postures. In this issue, common neck pathologies will be reviewed with special focus on the age-old “straight-neck” controversy and related conditions such as osteoarthritis, TMJ dysfunction and Dowager’s hump.

The physiology of muscle imbalance
In the early 1900s, Sir Charles Scott Sherrington, an English physiologist and Nobel Prize recipient, first described the neurological concept of reciprocal innervation. Simply stated, if a muscle receives a nerve impulse to contract, its antagonist simultaneously receives a nerve impulse to relax. Sherrington’s Law of Reciprocal Inhibition further describes how one muscle group neurologically weakens when length-tension imbalance occurs to paired antagonists; i.e., tight pectorals overpowering and reciprocally weakening rhomboid major and lower trapezius. But why do these substitution patterns develop? Altered length-tension imbalance patterns typically result from faulty posture, gravitational stress, repetitive movement, cumulative trauma, and loss of neuromuscular control.

Synergistic dominance
Synergistic may be defined as “acting together; enhancing the effect of another force.” Therefore, if muscles perform the same task at a particular joint, they are termed synergistic. Synergistic dominance occurs as “helper” muscles are recruited to take over function when a “prime mover” muscle fails, much like when a football coach calls in the substitute players when a key player is injured. Synergistic stabilizers are designed to help but not be primary contributors to a particular movement.
Reciprocal inhibition is often the precursor to synergistic dominance. For example, in forward-head postures, the client’s suboccipitals are often maintained in a hypercontracted state as they battle gravity to keep the eyes level with the horizon. As the head cocks back and moves forward on the neck, the antagonist longus capitis muscles—which bind the anterior surface of the upper cervical vertebrae to the occipital base—become overstretched and weak. Sensing the longus capitis muscles can no longer carry out their duty as primary head-on-neck flexors, the brain calls on the powerful sternocleidomastoids (SCMs) as pinch-hitters.

The SCMs are reliable neck flexors when allowed to fire in proper order. However, they serve as poor subs for longus capitis due to their insertion at the mastoid process. When reciprocally weakened longus capitis muscles give out, the powerful SCMs are forced to fire first, causing the head to cock back into extension (not flexion). Although the suboccipitals appreciate added hyperextension support from the SCMs, neural and vascular structures embedded at the posterior O-A joint aren’t so happy with the excessive compression. Therapists may choose from several strategies to unwind this common head-on-neck imbalance pattern. Two approaches for releasing tight suboccipitals and SCMs are demonstrated in Figures 1 and 2. The “chin-tucking” exercise shown in Figure 3 helps tonify weak deep-neck flexors.

When the neck’s normal firing-order sequence is disrupted, synergistic muscles can torsion and compress facet joints, causing chronic degenerative conditions such as osteoarthritis, migraines and Dowager’s hump. The brain compensates by layering the area with protective muscle spasm, which perpetuates pain-spasm-pain cycles as the neck’s firing order pattern is further disrupted. Fortunately, the trained eye of structural-ly-trained pain-management therapists can usually spot synergistic dominance patterns. The client’s gait may reveal certain body parts that appear frozen in time, as chronically embedded compensations have caused the brain to sacrifice complexity of movement for stability. Fortunately, simple tests help determine if synergistic dominance exists at a particular joint.

**Figure 1. Suboccipital receptor release.** To co-activate Golgi receptors and stretch suboccipitals, the therapist flexes the client’s head as thumbs search for fibrosis and myospasm along the occipital ridge. If adherent tissue is palpated, the client is asked to inhale and gently hyperextend his head against the therapist’s resistance to a count of five. The client exhales and the therapist’s thumb pressure produces a postisometric and Golgi receptor release of the suboccipitals. The client’s head is brought to new flexion barrier, the technique is repeated, and the therapist rotates the head to treat all capital extensors. Retest for improved O-A flexion.

**Figure 2. SCM receptor release.** The sidelying client raises his head and rotates toward the table to expose the SCM muscle belly. The therapist’s soft finger pads hook the SCM as the client continues left head-rotation against the therapist’s resistance until a Golgi tendon release is experienced. The client controls the amount of available stretch by increasing left-head-rotation. No pulse should be felt during this technique.

**Figure 3. Chin-tucking exercise.** The client is instructed to tuck his chin while attempting to raise his head toward the ceiling to a count of three, and then relax. Repeat this maneuver 10 times twice a day to strengthen longus capitis/collis.
Head-raise test
Forward bending of the head and neck with the client in a supine position should initiate the following firing-order sequence: longus capitis, longus colli, anterior scalenes, and SCMs. The deepest intrinsic muscles must fire first starting with longus capitis flexing the head on the neck followed by longus colli initiating the beginning of neck flexion. Anterior scalenes and SCMs can then join forces to produce smooth head-and-neck flexion. The most commonly seen substitution pattern (SCMs, anterior scalenes, longus colli, and longus capitis) causes the chin to reach toward the ceiling rather than tucking into the chest during the first two inches of flexion efforts (Figure 4). The head-raise test alerts the therapist as to which muscles need lengthening and which must be tonified. Tension-length imbalances are usually easy to fix, as the therapist’s fingers, elbows and fists release and separate muscle adhesions and contractures allowing fascial bags to glide freely on neighboring structures. By performing the head-raise test before and after each neck session, aberrant substitution patterns can be easily identified and corrected. Therapists will discover greater therapeutic benefits as postural and firing-order evaluations are incorporated into their pain-management protocol.

Class II bowed-neck posture
The Class II forward head in Figure 5 represents a good example of synergistic dominance. Note how the reciprocally weakened longus capitis muscles allow the SCMs to cock the head and bow the neck. As the tight short cervical extensors (semispinalis, splenius and longissimus) overpower longus colli, the anterior longitudinal ligament reluctantly overstretches, permitting increased neck bowing (Figure 6). Due to firm attachments at the vertebral bodies and intervertebral discs, the anterior and posterior longitudinal ligaments have been assigned the arduous task of stabilizing vital structures, such as the spinal cord and nerve roots. Sadly, the cervical spine’s anterior longitudinal ligament is a much thinner and weaker structure than the posterior. The opposite arrangement exists in the lumbar spine. Mother Nature’s choice of ligament placement warrants a well-deserved reversal! Due to ligamentous size and strength, these poorly designated structures do not provide optimal neck or low-back support in human upright posture. It is easy to visualize how additional cervical-anterior longitudinal-ligament thickness would help reinforce Class II extensor-dominant bowed-necks. Excessive curve at C4-5 and C5-6 from anterior and posterior ligament laxity is a major cause of cervical disc radiculopathy, facet dysfunction and bone-spurring.

Figure 4. Head-raise test.
The supine client raises his head from the table while the therapist closely observes the direction of chin movement. An optimal firing-order pattern during head/neck flexion (longus capitis, longus colli, anterior scalenes and SCMs) causes the chin to tuck toward the chest during the first two inches of flexion. In forward-head postures, hyper tonic suboccipitals reciprocally weaken longus capitis, causing the SCMs to fire first. The chin responds by reaching toward the ceiling rather than tucking toward the chest.

Figure 5. The three most common neck and jaw postural patterns
When comparing Class II and III structures to Class I, Normal, the line of weight bearing (LWB) falls more posterior to the plumb line in the Class II, retracted jaw, (extensor-dominant neck) and anterior in the Class III, protrusive jaw (flexor-dominant neck). Class II presents with a hyperlordotic neck with the apex peaking at about C4-5—C5-6—the two most common areas of disc herniation in the cervical spine. The Class II subject is also likely to experience TMJ dysfunction as the mandible is crammed into the condyles. Adapted from Ross Pope with permission, 2003.

Figure 6. Anterior longitudinal ligament.
The cervical spine’s anterior longitudinal ligament is a much thinner and weaker structure than the posterior. When reciprocally weakened, longus capitis muscles allow the SCMs to cock the head and bow the neck, the anterior longitudinal ligament overstretches creating an unstable cervical spine. Adapted from Blausen Medical, 2002. Reprinted with permission.
Forward heads and jaw retrusion

In Part I, jaw retrusion was shown to be tied to forward-head posture. It was noted how hypertonic hyoids and digastric muscles can create a strong inferoposterior pull, which holds the jaw back as the head moves forward (Figure 7). To keep the mouth from hanging open, the temporalis and masseter muscles are forced into co-contraction. The combined forces of these four muscle groups jam the mandibular condyles and disc into the fossa, causing compression, jaw retrusion, disc displacement, and TMJ pain.

By systematically releasing hypertonic hyoid, digastric, masseter, and temporalis muscles, the condyles move more freely in the mandibular fossa as compressional and torsional forces release their grip on temporomandibular structures. Since many aberrant postural patterns begin from the top down, it is sometimes necessary to begin neck sessions with TMJ work. Restoring proper jaw alignment often sympathetically balances distorted O-A joint tissues. A unilaterally compressed mandible can sidebend occiput on atlas, creating compensatory cervical-sciotic patterns that travel through the trunk and into the pelvis, causing sacroiliac pain and dysfunction.

Correcting the client’s bite through precise TMJ and O-A work often serves to shut down hyperexcited neural activity (tonic neck reflexes) before compensatory patterns descend to cervicothoracic, thoracolumbar and lumbosacral crossover junctions. Client-retraining exercises that tone weak longus capitis/collis, lower-shoulder stabilizers, posterior rotator cuff, and transversus abdominis musculature provide needed upper-quadrant support for proper head-on-neck balance.

Class III: The military neck

In myoskeletal terminology, a Class III protrusive jaw correlates with a flexor-dominant “military neck” due to the strong influence of the deep flexor necks in flattening (and sometimes reversing) cervical lordosis. Figure 5 depicts how a flexor-dominant neck promotes jaw protrusion—or vice versa. Class III distorted postures are commonly seen in clients presenting with an abnormal jaw overbite. The resulting posterior head shift and compensatory cervical, thoracic and lumbar adaptations force the body to fall behind the line of weight bearing (LWB).

From a sagittal view, these structural compensations manifest as knee hyperextension, reduced lumbar lordosis, decreased thoracic kyphosis, and occipitoatlantal flexion. There is no mistaking this type of straight neck. As the jaw protrudes and head cocks forward, normal cervical lordosis gives way to a vertically aligned neck. Fortunately, few clients present with a true Class III block-on-block flat-necked posture but those who do present a major therapeutic challenge. Structural integrators generally agree that it is much easier to remove excessive spinal curve than to create it.

Perhaps the most common traumatically induced instigator of this straight-necked disorder occurs from rear-end acceleration/deceleration whiplash injuries. As the neck and head whip back into hyperextension longus capitis/collis, anterior scalenes and anterior longitudinal ligament can be strained or torn (Figure 8). The healing process is accompanied by a muscle-and-ligament shortening process, as collagen bundles and injured sarcomeres randomly lay down adhesive scar tissue, causing facet compression, disc flattening and loss of cervical curve.
forward on the neck through the occipitoatlantal condyles. As gravity pulls the head down (chin-tucking), the suboccipitals overstretch and eccentrically contract, causing neural and vascular problems. Prolonged stretch at the cervicocranial junction can de-innervate rectus capitis posterior minor, damage cranial and spinal nerves, occlude vertebral arteries, and constrict internal jugular vein drainage from the brain.

**Class IV: The straight neck**

One final head-forward posture that merits discussion is the capital extensor-dominant neck. This ornery, often misunderstood cervical spine abnormality has risen in popularity primarily due to the proliferation of computers and other work terminals. With every hour spent leaning over a computer, stubbornly induced muscle-imbalance patterns sink their oppressive tentacles into deep spinal structures.

Chiropractors often refer to this Class IV head-forward posture as a "straight neck" (Figure 9). This label has caused much confusion since the neck appears to be flexing forward and in no way resembles the block-on-block military neck described earlier. During prolonged sitting, the capital extensor-dominant neck begins losing the battle with gravity as deep stretch-weakened extensors allow the neck to forward-bend on the thorax. Close observation of Class IV necks shows the cervical spine forward-bending segment by segment, beginning with: C-7 flexing on its inferior neighbor, T-1; C-6 on 7; 5 on 6; etc. Somewhere between C2-3 and the cervicocranial (O-A) junction, the brain begins to apply the brakes by neurologically contracting the suboccipitals and other capital extensors in an effort to pull the head back up on the neck to level the eyes.

Forward-drawn, straight-necked postures are the most commonly seen of all aberrant upper quadrant patterns and like Class II bowed-necks are often accompanied by retractive jaws. However, in Class IV necks eccentrically-contracted cervical extensors such as semispinalis, splenius and longissimus cervicis are weak and overstretched, allowing the neck to move forward on the thorax; there is no bowing. Conversely, all the capital extensors (attaching to the occipital ridge) are stuck short in sustained isometric contraction. Fortunately, the concentrically contracted capital extensors (semispinalis capitis, splenius capitis, longissimus capitis, suboccipitals and upper trapezius) are easy to lengthen using specific deep-tissue and assisted stretching routines, such as those demonstrated in Figures 10 and 11.
For example, any leg-length discrepancy alters the position of the pelvis (iliosacral rotation), which ultimately compensates at the cervico-cranial junction. Conversely, prolonged O-A, A-A and C2-C3 derangement sparks tonic reflexes that can travel down intersegmental pathways adversely affecting all trunk, pelvic and lower-limb balance.

Such compensatory activity leads to increased muscle tone, scoliotic patterns and joint dysfunction at critical cervico-cranial, cervico-thoracic, thoraco-lumbar and lumbosacral transitional zones. In the presence of pelvic obliquity and resulting spinal soft-tissue compensations, treating the neck in isolation offers purely a temporary and limited effect. Regardless of the type of pain the client is experiencing, posture should be persistently targeted. Some mistakenly believe pain-management postural integration to be overly complex and too time-consuming. However, technological advances detailing predictable muscle imbalance patterns (possibly ingrained from third-trimester trimester fetal positioning) have simplified and elevated the manual therapist’s ability to assess and correct distorted postural patterns.

It is tempting for therapists to immediately resort to chasing the pain rather than developing sensible strategies to effectively deal with the client’s problem. Both client and therapist often settle for any immediate symptom alleviation. Yet a strongly holistic approach that focuses on bringing the body back into balance offers more satisfying long-term outcomes that ultimately help prevent future recurrences of acute pain and leads to more productive living.

Notes

Erik Dalton, Ph.D., shares his broad therapeutic background in massage, Rolfing and osteopathy through innovative pain-management workshops, books and videos. Developer of the Myoskeletal Alignment Techniques and founder of the Freedom From Pain Institute, Dalton is dedicated to research and treatment of chronic pain conditions. Freedom From Pain Institute workshops and home-study courses are approved by the National Certification Board for Therapeutic Massage and Bodywork, the Florida Board of Health and most state certifying agencies. Visit www.ErikDalton.com to subscribe to free monthly pain-management newsletters.