CHAPTER 7

ANTERIOR TORSO COMPARTMENT (ATC)

LEARNING OUTCOMES

After completing this chapter, you will be able to:

7.1 Define the origins and insertions of the muscles of the ATC.
7.2 Describe the actions of the ATC.
7.3 Recognize the pain patterns of the ATC.
7.4 Discuss the clinical notes for and the importance of treating the muscles of the ATC.
7.5 Demonstrate the client positioning and treatment routines related to the ATC
7.6 Demonstrate safe and effective stretching techniques for the muscles of the ATC.

OVERVIEW

Like the posterior lower extremity compartment (PLEC), the anterior torso compartment (ATC) includes muscles that pull the rib cage down, flatten the lumbar spine, compress the lumbar and cervical disks, and entail many muscular imbalances that cause stooped posture and pain.

Shortened abdominal muscles will pull the rib cage down and cause a forward neck and head positioning (FHP). Often, this downward collapsed, "stooped" posture will reverse the cervical curvature of the spine and compress the lower cervical disks and suboccipital joints, subsequently decreasing cervical range of motion and many back, shoulder, and upper-extremity pain syndromes. The extensors of the lumbar and cervical spine and the retractor muscles of the scapulae often are tighter, produce the most trigger points, and elicit the most pain. It is these posterior compartment muscles that countertighten and resist the forward and downward pulls of tension from the shortened trunk flexors and hip extensors. (An analogy: A tree is held up with guide wires and the tree bends to one side from sustained winds—it is the lengthened wires that become tighter as they resist the weight of the tree being pulled over by the wind.) The abdominals, psoas, serratus anterior, pectorals, and anterior cervicals are a kinetic chain that, when short, often causes chronic pain of the low back, neck, and shoulders. Often, chronic back, neck, and shoulder pain associated with muscular imbalances that effect stooped posture can be reduced and even eliminated with treatment to the short muscles in the anterior torso, rather than the painful ones often experienced in the posterior torso. Lengthening the abdominals will create space between the pelvis and the rib cage. Lengthening the serratus anterior and pectorals will create space between the shoulder girdles and the pelvis, thereby allowing the scapulae to drift up and back, restoring the body to a more upright posture. Treatment for stooped posture and forward neck and head positioning should consist of combining both the abdominals and the hamstrings within each session. Lengthening the hamstrings will cause the pelvis to rotate up and forward, increasing the lumbar curve and thereby greatly reducing the compression effect on the lumbar spinal disks. The combined treatments (ATC and PLEC) will restore the body to an upright posture, thereby decreasing the chronic pain that is often experienced in the posterior torso.

Note: The anterior torso is the emotional cylinder of the body. Playing the edge with precision and focused intent will allow the client to stay relaxed and allow you to have deeper access into the deeper layers of the abdominal wall.

Precise hand placements and treatment routines of the abdominal, chest, and anterior cervical muscles are clearly covered in this chapter to teach students how to work in these sensitive and emotional areas. The ATC therapy routines show students how to develop their skills and will help students become proficient when working with clients whose back and neck pain is the result of muscular imbalances and stooped posture.

CLINICAL SUCCESS

In 2001, a professional golfer on the PGA tour went to a therapist. He complained of a "slight numbness in his fingers with a considerable amount of decreased grip strength of his hands." Over the course of 3 years, this client had seen numerous health care specialists and been told that he probably had a "neck stinger." The therapist believed that the man's complaint was the result of cervical disk compression, irritating the nerve roots at the C4 through C7 levels, as well as entrapment of the nerve supply exiting the soft tissues of his anterior and lateral neck.

During a soft-look evaluation of the client's body, the therapist observed his projected forward head posture and suboccipital compression at the base of the occiput. He was a right-handed golfer and displayed a dropped right shoulder girdle and a locked short abdominal wall. He also had a significant number of muscular imbalances throughout his body. His primary complaints related to tingling, numbness, and weak grip strength; however, to achieve lasting results, it was necessary to address the imbalances that affected his overall posture.

The client was placed in the supine position on the table and a hard-look evaluation of his body was conducted. After thoroughly examining for lower-body deviations, the therapist concluded that the client's leg lengths and pelvic bones were symmetrical and that his primary complaint of bilateral upper-extremity numbness and weakness was most likely isolated in the neck and the thoracic outlet. The client was moved into a side-lying position aided by a cushioned body support system. The treatment plan consisted of releasing the anterior cervical muscles, primarily the longus colli, the longus capitis, and the scalene muscles. Releasing these muscles would help restore much of his cervical lordosis, thereby reducing the compression effect on his spinal nerves and at the base of the occiput.

The muscles attached on the anterior tubercles were isolated, and the therapist proceeded to apply slow, deep compression to the scalene muscles; this triggered referrals down the client's arm and hand. The therapist treated the client bilaterally with a 2:1 ratio, spending more time on the left elevated side; the client's posterior suboccipital muscles were released. This corrected the positioning of his tilted head and increased his cervical range of motion. A total of 6 hours in 3 days was spent restoring symmetry to his thoracic and cervical muscles.

Slow, focused, and isolated work in the appropriate areas produced remarkable results. These results were leveled shoulder girdles, lengthened abdominal muscles with increased fluid trunk rotation, a substantial increase in cervical hyperextension and rotation, and full reduction of symptoms in his hands and better overall posture. The client experienced no discomfort during the therapy sessions and no residual discomfort during his tournament play.

ABDOMINALS

RECTUS ABDOMINIS, FIGURES 7.1 AND 7.2

ORIGIN	Costal cartilages 5, 6, and 7
INSERTION	Anterior pubic bone
ACTION	Flexes vertebral column; compresses abdominal contents
MYOTOME	T7–T12

EXTERNAL OBLIQUE, FIGURES 7.3 AND 7.4

ORIGIN	Lower eight ribs
INSERTION	Abdominal fascia, iliac crest, and linea alba
ACTION	*Bilaterally:* flexes trunk; compresses abdominal contents
	Unilaterally: laterally flexes trunk; rotates trunk to opposite side
MYOTOME	T8–T12

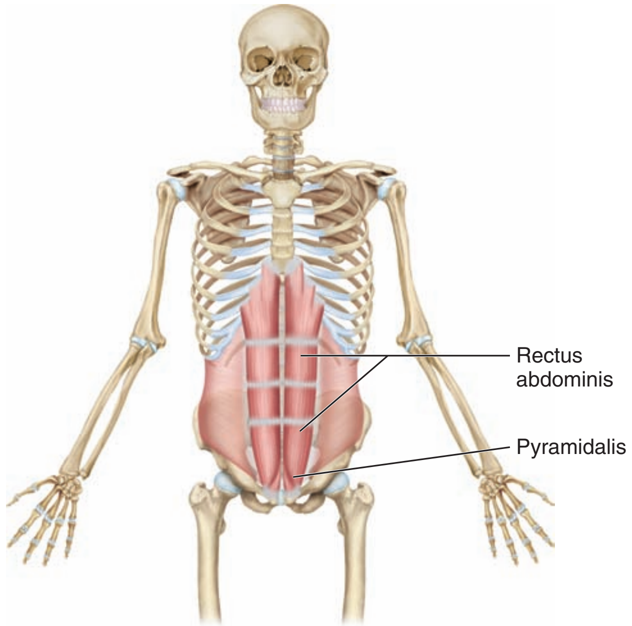


FIGURE 7.1 **Rectus Abdominis Muscles**

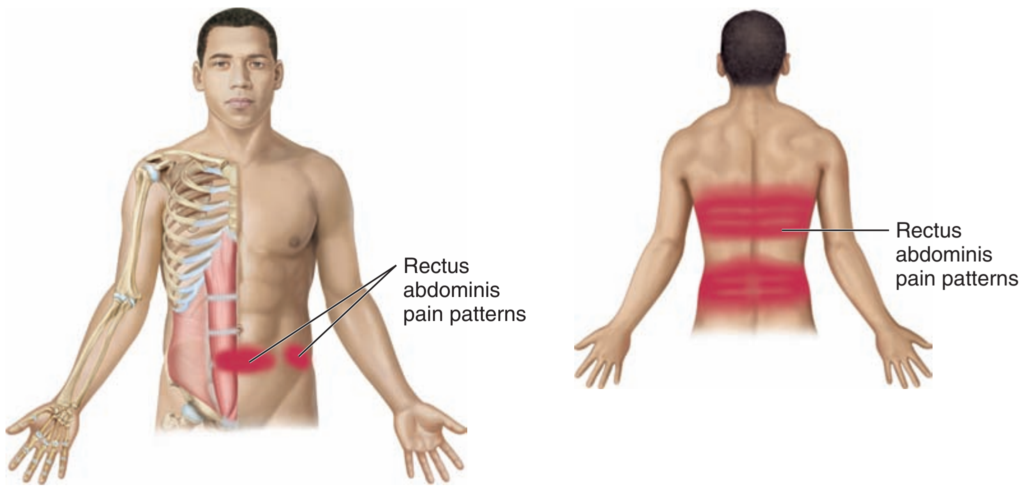


FIGURE 7.2 **Rectus Abdominis Muscle and Referred Pain Patterns**

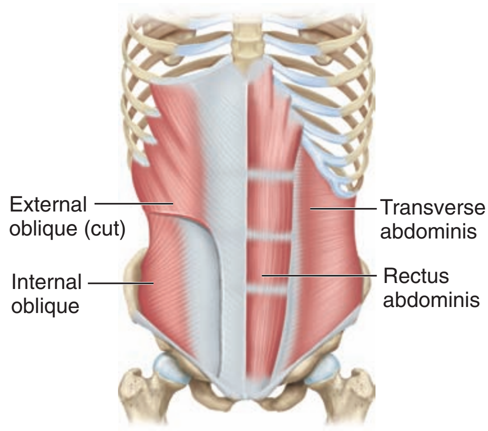


FIGURE 7.3 **External and Internal Obliques and Transverse Abdominis Muscles**

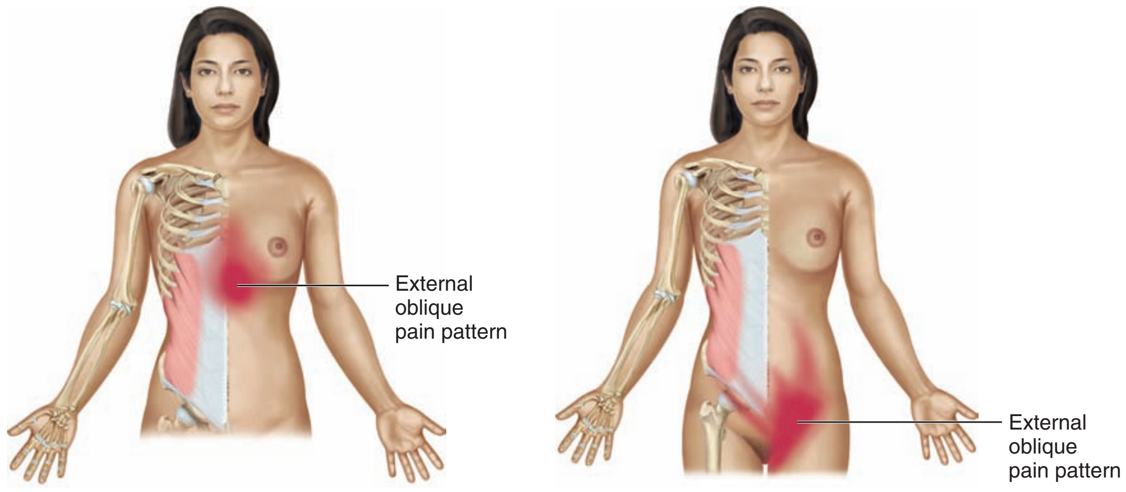


FIGURE 7.4 **External Oblique Muscle and Referred Pain Patterns**

INTERNAL OBLIQUE, FIGURES 7.3 AND 7.5

ORIGIN	Inguinal ligament and iliac crest
INSERTION	Costal cartilages of last four ribs, abdominal fascia, and linea alba
ACTION	*Bilaterally:* flexes trunk; compresses abdominal contents
	Unilaterally: laterally flexes trunk; rotates trunk to same side
MYOTOME	T8–T12

TRANSVERSE ABDOMINIS, FIGURES 7.3 AND 7.6

ORIGIN	Inguinal ligament, iliac crest, and thoracolumbar fascia
INSERTION	Abdominal fascia, linea alba, and pubis
ACTION	Compresses abdominal contents
MYOTOME	T7–T12

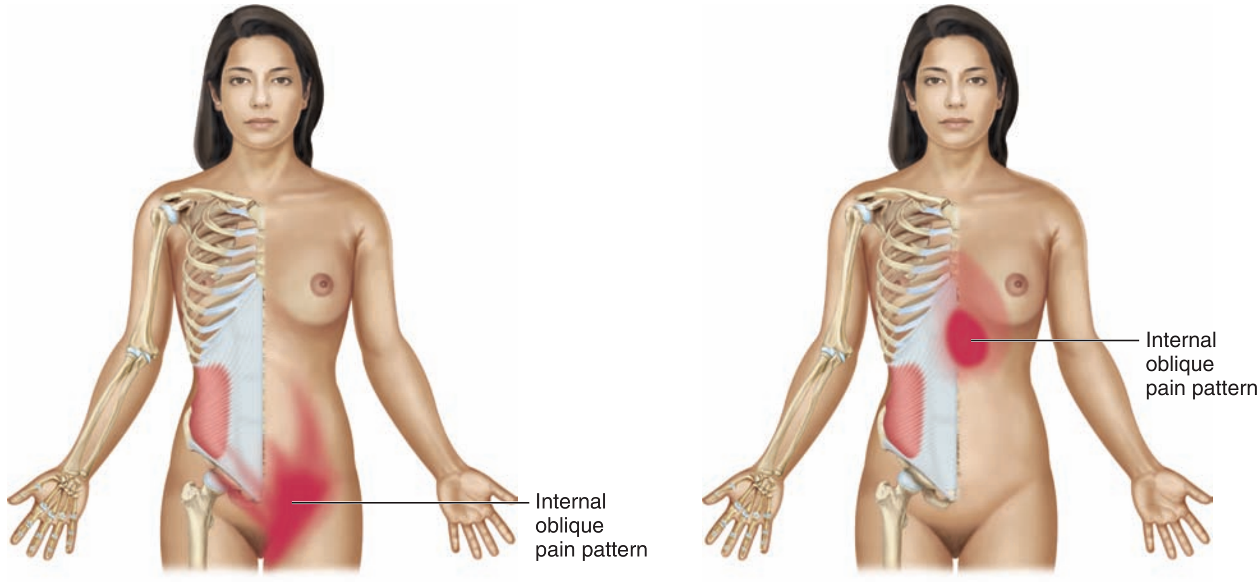


FIGURE 7.5 **Internal Oblique Muscle and Referred Pain Patterns**

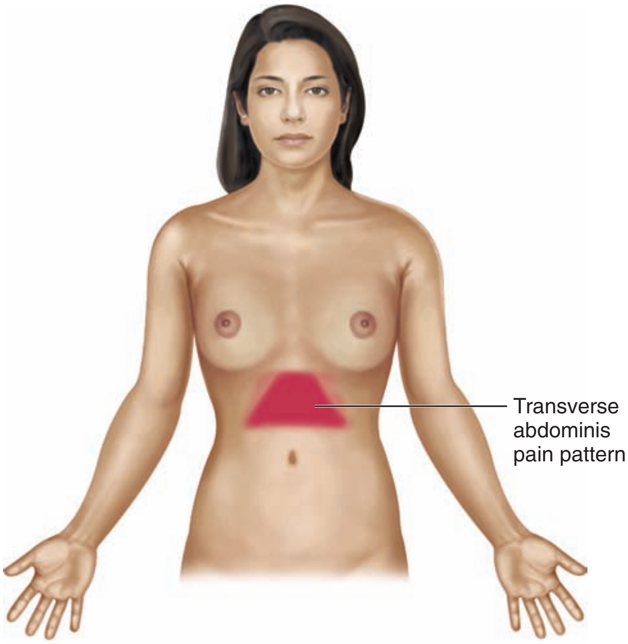


FIGURE 7.6 **Transverse Abdominis Referred Pain Pattern**

CLINICAL NOTES: Abdominals

The abdominal muscles lie in the following order from superficial to deep: rectus abdominis, which runs superior to inferior; external oblique, which travels toward the midline; internal oblique, which travels away from the midline; and transverse abdominis, which travels horizontally around the abdominal contents.

The abdominals work together to compress the abdominal contents and hold them in place. The transverse abdominis, being the primary, deepest abdominal muscle, creates a proper and true, noncompressive extension of the lumbar spine, or proper lordosis. The transverse abdominis also lifts the rib cage upward, taking the pressure off the lumbar vertebrae (decompressing the lumbar vertebrae by about 30 percent), and is the prime assister of complete exhalation. The rectus abdominis attaches midline to the rib cage and travels vertically to the pubic bone; therefore, it is the prime flexor of the trunk at the waistline. The internal oblique rotates the trunk toward the same side, while the external oblique rotates the trunk toward the opposite side; therefore, the internal and external obliques are synergistic to each other on opposite sides and antagonistic to each other on the same side. Both the internal and external obliques also contribute to lateral flexion of the trunk; rectus abdominis flexes the vertebral column.

Any sustained pain (acute or chronic) of the abdomen should be referred to a primary care physician for proper medical and diagnostic evaluation. Abdominal pain can be the cause or result of a somatic-visceral response or a visceral-somatic response. In other words, it is very difficult to determine if the underlying problem is within the internal organs or the muscles, bones, and so on.

The primary referred pain pattern of the oblique muscles is in the upper abdominal quadrants just below the sternum; this pain is often confused with symptoms of gastrointestinal disturbances. Lower abdominal pain can also be associated with trigger point pain referring from the oblique muscles, which can facilitate pain into the groin and genitalia, thereby producing symptoms of urinary and bladder disturbances.

Increased tension in the abdominal musculature can be the result of physical activities that require a vigorous full-body twisting motion, sit-ups and other similar abdominal exercises, chronic occupational strain, structural anomalies, and/or functional deviations of the pelvis or lower extremities. Shallow breathing is also a sign of tight abdominals.

A "seated-chair client" is a person who spends most of the time sitting. Inadequate lumbar support over a long period of time, as seen in occupations that require sitting, will often cause a seated-chair client to slouch. Sitting slouched causes posterior rotation of the pelvis and loss of lumbar lordosis. This poor postural habit weakens the transverse abdominis, further facilitating the flattening of the lumbar spine. Even though the space is decreasing between the rib cage and the pelvis from slouched posture, the transverse abdominis is often left slack and often loses its ability to function properly. As the space between the rib cage and the pelvis decreases, so does the space for the abdominal contents. Loss of space increases the abdominal pressure and forces the abdominal contents to "pooch out"; this further inhibits the function, maintaining lumbar lordosis. Slouched and stooped postures also involve the serratus anterior. The serratus anterior muscle is the primary protractor of the scapula, and its fibers interdigitate with those of the external oblique along the anterior-lateral rib cage. Protraction from the serratus anterior will cause the scapula to slide forward around the rib cage, further shortening the pectoral muscle and bringing the arm toward the chest; this is viewed as a rounded shoulder. It must be emphasized again that short trunk flexors and short hip extensors cause stooped posture and that, to avoid future problems, lengthening of the abdominals and hamstrings is essential in restoring the body to an upright physiologically efficient posture. Pain is a signal of abnormal physiology; and the signaling of pain is often a sign of neuromuscular exhaustion from chronic muscle and nerve tension and is frequently experienced in the lengthened posterior torso muscles of the lower back, neck, and shoulders. These frequently experienced pain symptoms are the body's way of communicating that it's tired of holding the body upright from the forward collapsing that is associated with stooped posture. The muscles of the posterior torso, primarily the extensors and retractors, countertighten in an effort to support the upper body and resist its falling forward off the gravitational line. Forward neck and head positioning resulting from stooped posture causes posterior neck pain, especially at the base of the occiput. Shortening of the posterior suboccipital muscles compresses the suboccipital joints, as this is the body's last-ditch effort to rock the head back, leveling the eyes to the horizon. These compressed joints often cause headaches and restrict cervical motion.

Postoperative scar tissue in the abdominal area can be treated with massage therapy. Interweaving fascial bands around an incision site should be treated. However, reducing the muscle tension in the muscle bellies will ultimately produce better results, as releasing and lengthening the musculature will assist in the softening of the scar. Superficial work, including fascial stretching along the Langer lines, is very beneficial when the therapist is working with scarring. At the level of the waist and the abdomen, the Langer lines wrap around the body horizontally. *Langer lines* are lines of tension in the skin's elastic component due to the alignment of the collagen fibers in the dermis. They are used frequently in surgical procedures as a guide for cutting. If a cut is made along a Langer line, the scar is likely to be less severe; cutting across a Langer line will cause a more prominent scar. These lines often follow the skin's natural wrinkles.

ROUTINE: Abdominals

Position of client: supine.

Any sustained pain (acute or chronic) of the abdomen should be referred to the primary physician for proper medical and diagnostic evaluation.

1. Treat the anterior torso compartment with compression, separating the muscle divisions from the pubic bone to the rib cage. (See Figure 7.7.) Continue superiorly through the sternal and pectoral regions in a fan-shaped pattern ending at the clavicles.
2. This is a bilateral treatment; if the leg lengths are even, choose one side to treat first. If the client's leg lengths are uneven, spend more time treating the shorter-leg side in a 2:1 ratio, as opening the space between the rib cage and the pelvis will often allow the pelvis to drop and the rib cage to raise up, often leveling the iliums and leg lengths. Find the midline border (linea alba), and begin treatment directly lateral to the midline and inferior to the rib cage, using compression and slow gliding to treat the rectus abdominis muscle (Figure 7.8). Move inferiorly and continue static compressions making a total of four contact points before reaching the pubic bone.
3. Flex the trunk laterally, away from the side being treated. Move laterally into the obliques, and continue treatment with compression and slow gliding. Hold static compression at each contact when muscle tension is felt. Isolate approximately four contact points from the upper to lower abdominal wall. Treat each contact point with slow, deep compression while maintaining the client's edge. This allows the client to fully relax, thereby allowing you, the therapist, to proceed further into the deeper layers of the abdominal wall. (See Figure 7.9.) In

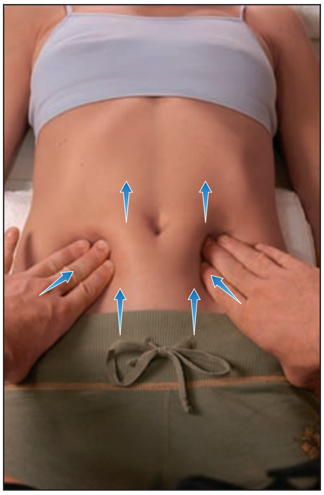


FIGURE 7.7

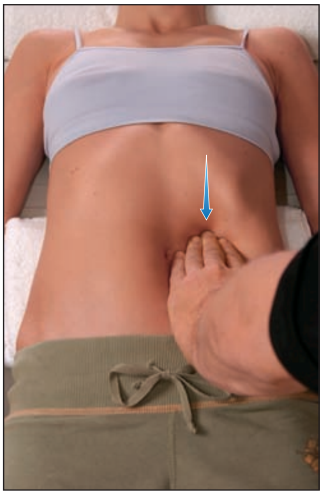


FIGURE 7.8

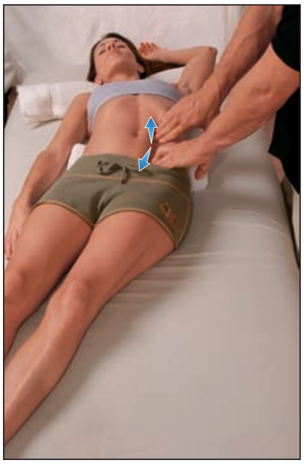


FIGURE 7.9a

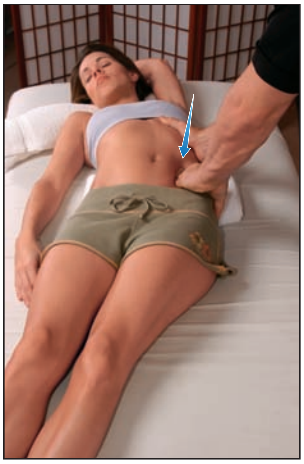


FIGURE 7.9b

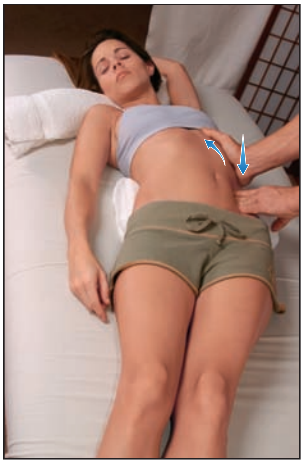


FIGURE 7.9c


FIGURE 7.9d

Figure 7.9d, the use of the elbow gives a broader contact point and a deeper compression into the muscles and should be practiced. Sitting in a comfortable position and leaning forward will allow you to sustain the broader compression for longer periods as well as rest your fingers.

4. Have your client turn to a side-lying position, arm extended over the head. Place a bolster in the space between the pelvis and the rib cage. Treat the lateral abdominal wall with myofascial stretching along the Langer lines with both hands moving horizontally down toward the table. (See Figure 7.10.)
5. Using the fingertips of one hand while stretching the myofascia with the other, treat the obliques with compression and myofascial stretching at the level of the waistline. Continue around the waistline from anterior to posterior, further treating the abdominals with compression and stretching. (See Figure 7.11.) Treat slowly, following the client's edge.
6. Using the thumbs, treat the muscles attaching to the rib cage with slow compression and friction. Opening up the spaces between the ribs will allow a fuller expansion of the rib cage on deeper inhalation. (See Figure 7.12.) Coach the client in deep breathing, and encourage the client to focus on full relaxation. Maintain the client's edge to avoid any pain or increased discomfort while continuing treatment throughout the anterior and lateral rib cage.


FIGURE 7.10


FIGURE 7.11

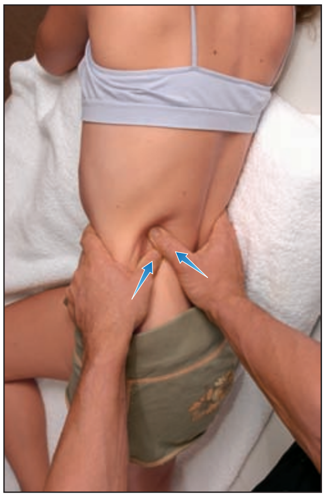


FIGURE 7.12

ILIOPSOAS

PSOAS MAJOR, FIGURES 7.13 AND 7.14

ORIGIN	Vertebral bodies, intervertebral disks, and anterior transverse processes of T12–L5
INSERTION	Lesser trochanter of femur
ACTION	Flexes hip; flexes lumbar vertebrae; controls rate of extension of lumbar vertebrae; proximates lumbar vertebrae toward femur
MYOTOME	L1–L4

ILIACUS, FIGURES 7.13 AND 7.14

ORIGIN	Inner surface of iliac fossa
INSERTION	Lesser trochanter of femur
ACTION	Flexes hip
MYOTOME	L2, L3

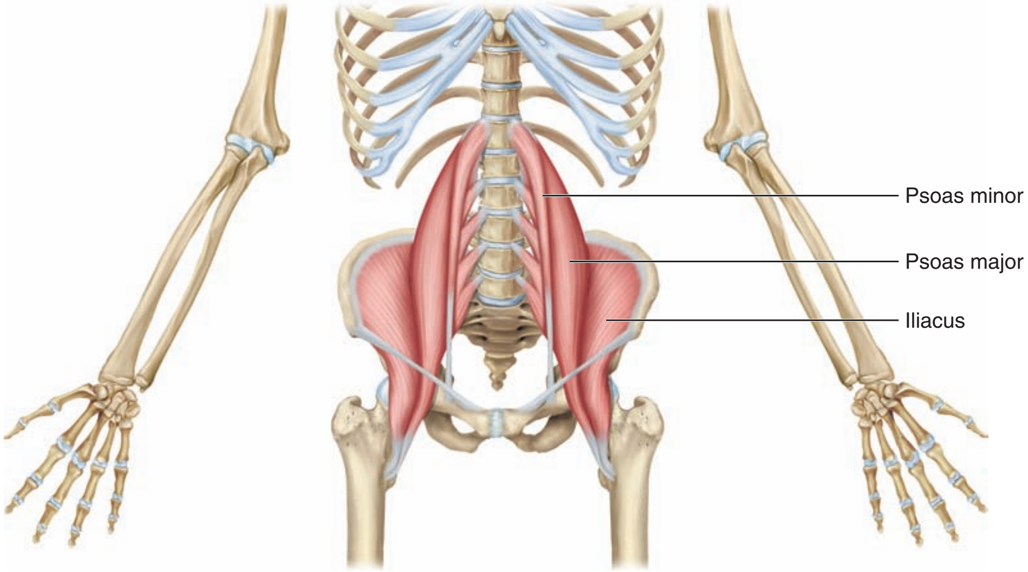


FIGURE 7.13 **Iliopsoas Muscles: Psoas Major, Psoas Minor, and Iliacus**

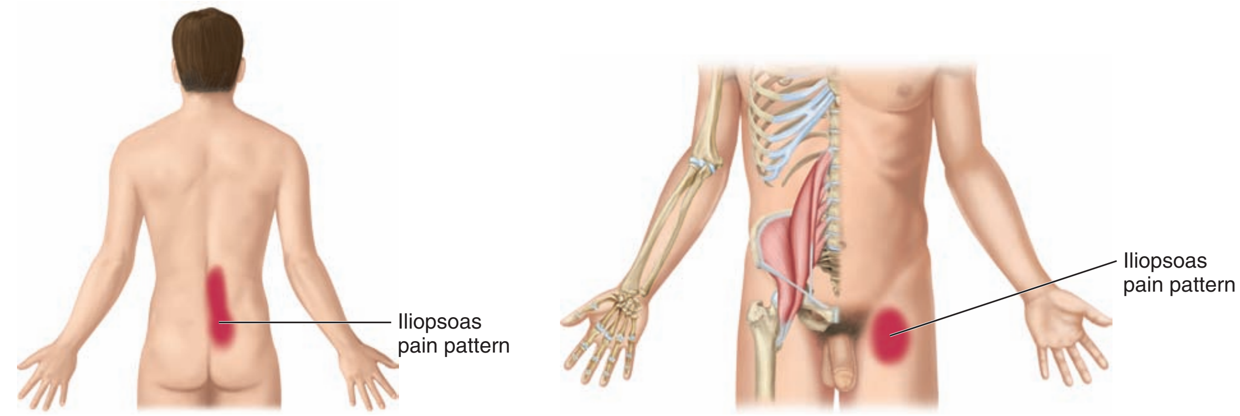


FIGURE 7.14 **Iliopsoas Muscles and Referred Pain Patterns**

CLINICAL NOTES: Iliopsoas

The iliopsoas is composed of two distinct muscles: the psoas major and the iliacus—with one common attachment. The psoas major arises from the lumbar vertebrae. The iliacus originates from the inner surface of the iliac fossa and is well established as the primary hip flexor. They both insert on the lesser trochanter of the femur. Psoas major is the only muscle that attaches the lumbar spine to the femur.

Many people think of the psoas as a primary postural stabilizer of the spine. Although it is often recruited as a postural stabilizer, that is not the proper or best use of the musculature. Other muscles are far more suited to this stabilizing function. If the overall structure remains open or decompressed and the posture is properly balanced in gravity, the psoas remains free to do its primary job, which is to produce, assist, and accommodate movement and action.

Functions of Psoas

There is no debate that the psoas major is a hip flexor. Yet there is much debate among researchers as to whether the iliopsoas is a flexor or an extensor of the lumbar spine.

Part of the confusion is that the psoas major is a hip flexor, and hip flexion is usually associated with, and often to some degree causes, increased lumbar extension or lordosis. As hip flexors rotate the pelvis anteriorly, the pelvis draws the spine forward with it. All things being otherwise equal, the lumbar vertebrae would most likely fan forward into a lordosis. Other muscular factors, however, resist this action.

(For clarification, it should be noted that the lifting of the femur toward the pelvis and the tilting of the pelvis down toward the femur are both, technically speaking, the same action: flexion of the hip. More precisely, hip flexion is a closing or decreasing of the angle between the femur and pelvis toward the front of the joint. Conversely, a posterior tilt of the pelvis is hip extension. Learning to think about joint movement in this fashion increases the student's ability to analyze posture and structure more precisely and efficiently.)

A number of factors influence the various actions of the psoas muscles. When the psoas contracts, it draws the femur up toward the spine, assuming that the spine is more stabilized than the femur.

If, however, the femur is more stabilized than the spine, the psoas draws the spine toward the femur, causing the spine to flex forward.

An increase in lumbar lordosis is by definition an increase in the curve of the lumbar spine. In a true lumbar lordosis, the vertebral bodies must be able to fan open toward the front of the abdomen, which is why true lumbar lordosis is synergistic with the chest, head, and neck moving up and back, not forward and down.

When viewed from the side, the psoas major lies in an almost vertical line along the lumbar spine and must pull each vertebral body downward toward the pelvis and femur. When this occurs, the psoas is actually decreasing the space between the vertebral bodies; flattening the lumbar arc. If there is a decreasing arc or arch in the lumbar spine, the vertebral bodies move closer to each other and the spinal disks are compressed. The overall spine moves forward and downward toward the femur; the lumbar vertebrae do not fan open to create lumbar extension—they close, creating lumbar flexion.

The psoas major muscle is, therefore, with a minor but significant exception at the L5-S1 joint (discussed later in this chapter), primarily a lumbar flexor. The psoas major does not create true lumbar extension or contribute to an actual lumbar lordosis; it actually resists it.

Psoas Controls Lumbar Extension

If the torso starts to lean backward, the psoas major will generate an eccentric contraction (a controlled lengthening by gradually reducing the level of tension) to prevent the spine from lengthening too far and too fast.

Psoas Reacts to Other Muscles

If the body is slouching forward and the abdominal wall and hip extensors are chronically short, it is far more common for the lumbar spine to be forced posteriorly and into chronic flexion. This draws the lumbar vertebral bodies toward each other, increasing compression of the spinal disks.

In response to the lumbar spine being pushed posteriorly (rearward) and the pelvis moving into a posterior tuck, the psoas major, being a hip flexor, contracts in an attempt to counteract the posterior pelvic tilt and flattening of the lumbar spine. But at this point, psoas is incapable of actually accomplishing this counteraction. Yet in its attempt to do so, the psoas major contracts across the vertical line through the lumbar vertebrae.

If indeed it is determined that psoas is contracted by way of reacting to overshortening of the hip extensors and abdominal wall, then, in therapy, one must release the abdominal flexors—the rectus abdominis, and external and internal obliques—and hip extensors—hamstrings, adductor magnus (long portion), gluteals, deep rotatores—to a significant degree before attempting to release the psoas major muscles. In many cases treating the psoas major without first addressing these muscles either ensures that the problem will quickly return or makes the problem worse in the long run.

Compression of Lumbar Spinal Disks

To reiterate, the psoas major muscle is perfectly placed to apply direct powerful downward forces that actually compress the lumbar vertebral bodies. This is a flexion, not an extension, of the lumbar spine. As the vertebral bodies compress and move toward each other, the disks in between the vertebral bodies must be compressed as well. This is, potentially, a common cause of long-term chronic disk degeneration from slight narrowing to total herniation and rupture. This condition often produces no pain, which is why it is often doubtful that compression of disks is necessarily the cause of back pain. Other than cases in which the disk protrudes back into the spinal canal and/or the neural foramina, the disks seldom have an opportunity to be the direct cause of pain.

Much back pain is caused by muscles irritating and sometimes entrapping sensory nerves. Many nerves run through and behind the psoas muscles and are subject to irritation and compression. Muscle tension also produces vertebral dysfunction and disk pathology often from muscles distant from the posterior torso, such as the hamstrings, gluteals, and abdominal muscles.

The Pars Vertebralis of Psoas

The pars vertebralis portion of the psoas consists of small slips of muscle, which are the deepest layers of the psoas major, linking from the 12th thoracic vertebra to the lumbar vertebral bodies (T12 through L5). This usually unnoticed portion of the psoas major is a direct flexor of the lumbar vertebral column and compressor of the intervertebral disks. (See Figure 7.15a.)

The pars vertebralis portion of the psoas major and the deepest fibers of the main body of the psoas major are the most inaccessible layers. Applying low-dose, micro-movement stretching (various small and gentle arching movements of the lumbar spine) is a way to access these muscles, although stretching does not in all cases immediately create the necessary changes if the involved fibers are too traumatized. A shortened or traumatized psoas requires the approach of the minimum-edge technique, which often requires manual therapy to assist the psoas stretch.

While it is true that the psoas major is, along with the iliacus, a primary hip flexor, it simultaneously is a lumbar flexor and actually limits or reduces lumbar extension, preventing true excess lordosis and sometimes eliminating it altogether. This is because the overall bulk, the most superficial portion of the psoas muscle, runs parallel with, and is also capable of compressing, the lumbar vertebrae.

"Mini-" or "Pseudo-" Lordosis

The minor but significant exception referred to earlier is produced by the structure of the L5-S1 joint. Because the 5th lumbar, as viewed from the side, appears as if it were positioned on a small, downward-sloping shelf projecting forward from the top of the sacrum, the psoas major can also be a powerful force pulling the 5th lumbar vertebra, and the whole lumbar column, forward and down. It is common to have muscles pulling so hard in opposite directions that while the hip extensors attempt to rotate the pelvis posteriorly, the psoas attempts to rotate the lumbar spine anteriorly. This causes a forward and downward shearing action of the L5 vertebrae that creates a "kink" at the posterior face of the lumbosacral joint. The "kink" contributes to the illusion of the "deep curve" in the lumbar area. A quick look by an untrained eye can mistake this "mini-" or "pseudo-" lordosis at the base of the posterior spine (which is restricted to the L5-S1, and possibly L5-L4, area) and other common postural illusions for a true lordosis of the entire lumbar spine. (See Figure 7.15b.)

Posterior Fibers of Psoas

Also complicating lower-back pain, though not all of them are directly attached to the lumbar vertebral bodies, are the deepest, most posterior long fibers of the psoas major. These fibers run upward from their insertion at the lesser trochanter to their origin, attaching to the anterior transverse processes of the lumbar vertebrae and iliolumbar ligaments. If these fibers are excessively and chronically contracted, their pulling force on these ligaments (ligaments being significantly more pain-sensitive than muscle fibers) could be a significant source of pain.

Lumbar Pain Pattern

The iliopsoas, abdominals, hamstrings and the erector spinae, multifidus, rotatores and quadratus lumborum muscles are often the culprits of a failed low back and/or chronic pain because they can generate opposing forces on the pelvis, sacrum and lumbar vertebrae, and intervertebral disks. Prolonged sitting with the hips acutely flexed will cause the iliopsoas to adaptively shorten. This, plus reactive forces from opposing muscles, creates compression, stress, and vertical pain along the spine (lamina groove) and sacroiliac joints. Secondary pain of the iliopsoas muscle will likely be present at the insertion sites on the lesser trochanter of the femur and on the anterior thigh and groin. A hypertense psoas major also contributes to the so-called hip-click phenomena as well.

Asymmetrical imbalances of the iliopsoas may contribute to a compensatory lumbar scoliosis. Both skeletal and myofascial asymmetries can be structural or functional and can occur in the lower

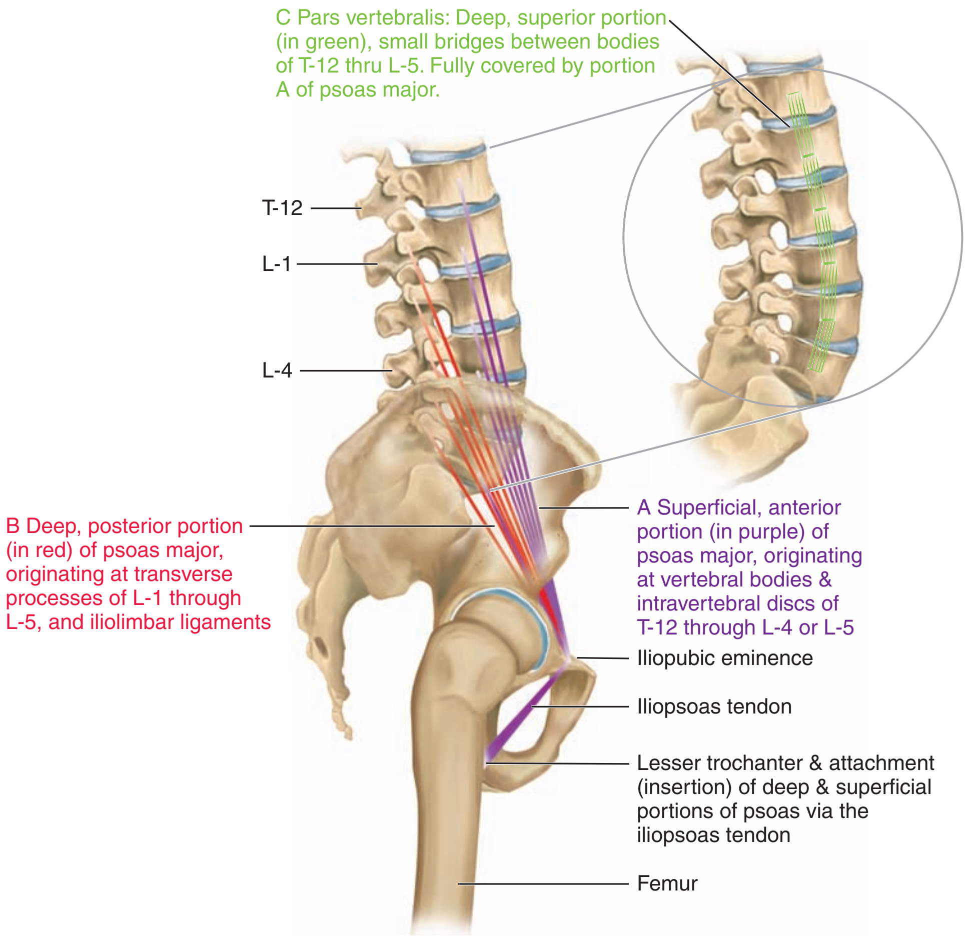
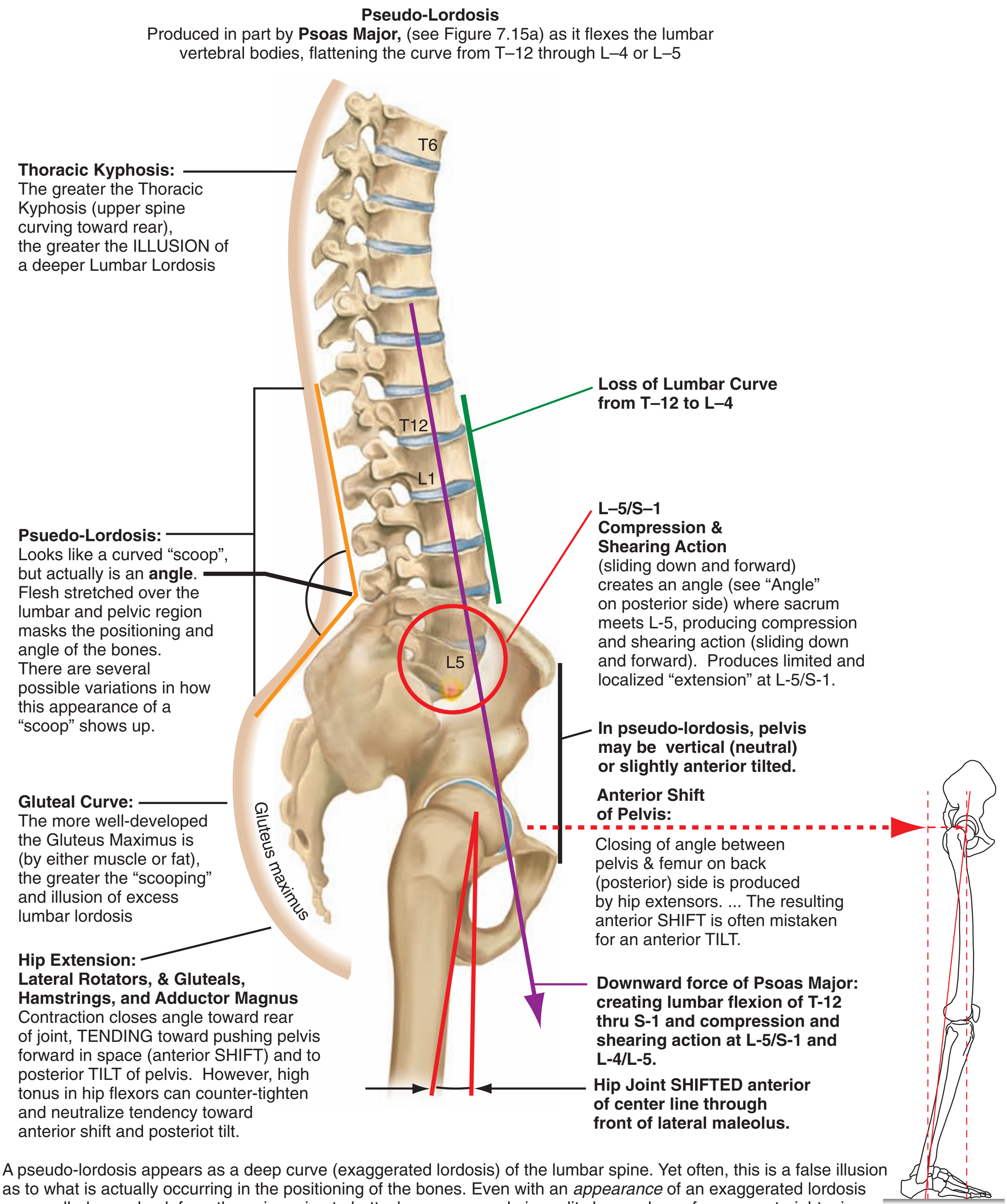


FIGURE 7.15a **Pars vertebralis**



A pseudo-lordosis appears as a deep curve (exaggerated lordosis) of the lumbar spine. Yet often, this is a false illusion as to what is actually occurring in the positioning of the bones. Even with an *appearance* of an exaggerated lordosis or so-called sway back from thoracic region to buttocks, many people in reality have a loss of curve, a straightening, of the actual lumbar vertebrae fromT–12 to L– 4. The overlying flesh often masks the true picture of what is actually occurring structurally (relationship between the bones). Treating such cases by tucking the pelvis or sacrum, flattening the low back, prematurely releasing the tension on the posterior lumbar spine, and other such actions further compresses the lumbar vertebral discs.

FIGURE 7.15b **Pseudo-Lordosis**

lumbar spine, pelvis, and/or lower extremities. For example, unless countered by an opposing muscle, a hypertonic iliopsoas muscle may cause a client to lean toward the hypertonic side, further involving the obliques, quadratus lumborum, erector spinea and latissimus dorsi muscles on the same side.

ROUTINE: Iliopsoas

Treating the abdominal muscles before treating the iliopsoas is recommended, as the tension in a hypertonic abdominal muscle can prevent lengthening of the iliopsoas.

Position of client: supine.

1. If pain is present in the lumbar and sacroiliac region, bend the knee and laterally rotate and abduct the thigh. Initially, your knee could be used as a temporary bolster while accessing the iliacus and psoas. It is important that the client is comfortable and the abdominal wall is relaxed. Apply compression and slow, deep effleurage to the abdominal wall separating the muscular divisions. (See Figure 7.16.)
2. Place the fingertips just lateral to the rectus abdominis. Use circular pressure to penetrate slowly, gradually proceeding deeper toward the spinal column. Synchronize the circular movements with the client's breathing to help avert her natural tendency to guard against abdominal penetration. (See Figure 7.17.) When the client communicates comfort, proceed into deeper layers, maintaining the client's edge. *No pain means more gain.*
3. To isolate the psoas major, keep the hands in the same place and have the client contract the psoas muscle by flexing the hip toward the chest. Resist the movement at the same time. Once the psoas has been isolated, have the client relax. Using contoured fingertips, explore as much of the psoas as possible from the inguinal ligament, moving superior toward the rib cage. (See Figures 7.18 and 7.19.) Using the edge technique, treat with compression and subtle friction. Suggest that the client use hand signals to ensure effective communication.
4. Using the fingertips of both hands, treat the iliacus muscle where it merges with the psoas major muscle, along the inner surface of the ilium. Penetrate toward the therapy table, staying along the inner surface of the ilium. Periodically have the client contract the iliopsoas group to verify the location. (See Figure 7.20.) *Bend the knee and laterally rotate and abduct the thigh.*
5. Outline the length of the psoas with both hands. Using fingertips and/or contoured hands, apply compression with one hand while the other glides away, applying a deep myofascial stretch. With the fingertips, continue

FIGURE 7.16

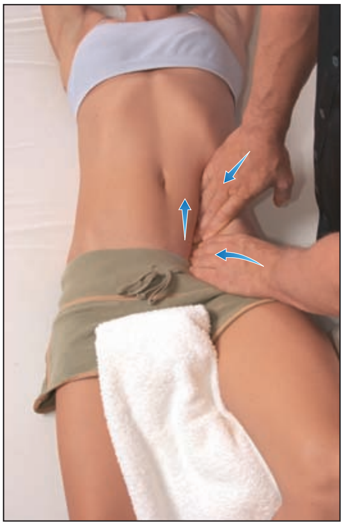


FIGURE 7.17

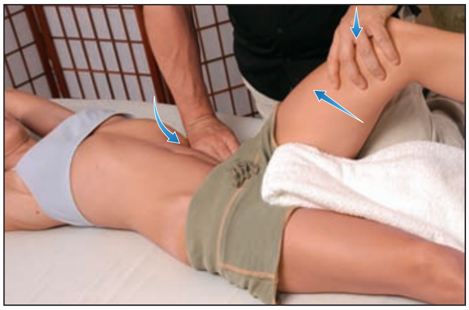


FIGURE 7.18

deep-gliding effleurage up to and as far under the inguinal ligament as the client will allow. (See Figure 7.21.) As the iliopsoas releases, lengthen it further by hanging the client's leg off the therapy table. Be sure to stabilize the leg. Repeat the routine if necessary.

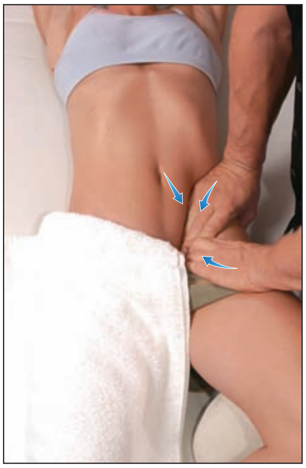


FIGURE 7.19

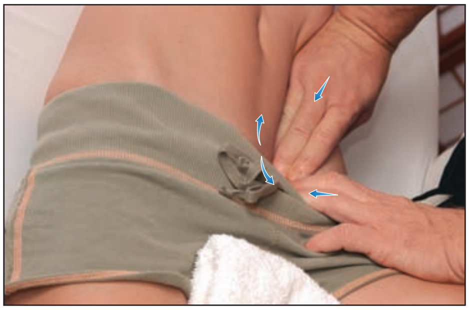


FIGURE 7.20

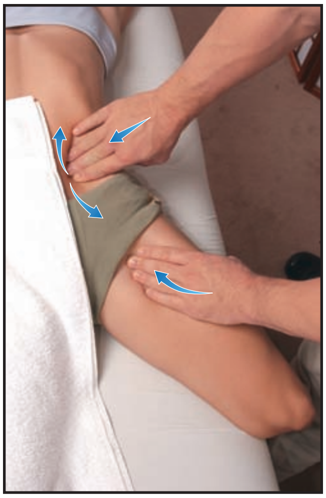


FIGURE 7.21

PECTORALIS MAJOR, FIGURES 7.22 AND 7.23

ORIGIN	*Clavicular head:* medial half of clavicle
	Sternal head: sternum from manubrium to zyphoid process
	Costal head: first six costal cartilage surfaces
INSERTION	Lateral lip of bicipital groove of humerus
ACTION	Adduction, flexion, medial rotation of humerus; depression of arm and shoulder
MYOTOME	C5–T1

PECTORALIS MINOR, FIGURES 7.24 AND 7.25

ORIGIN	Anterior 3rd, 4th, and 5th ribs near costal cartilage
INSERTION	Coracoid process of scapula
ACTION	Protracts, depresses, downwardly rotates scapula
MYOTOME	C8–T1

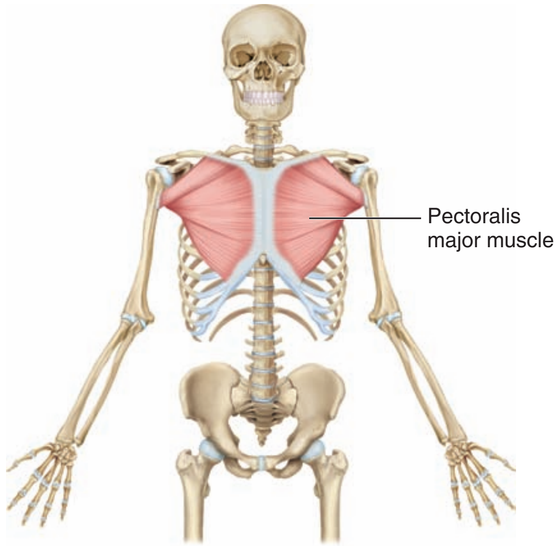


FIGURE 7.22 **Pectoralis Major Muscles**

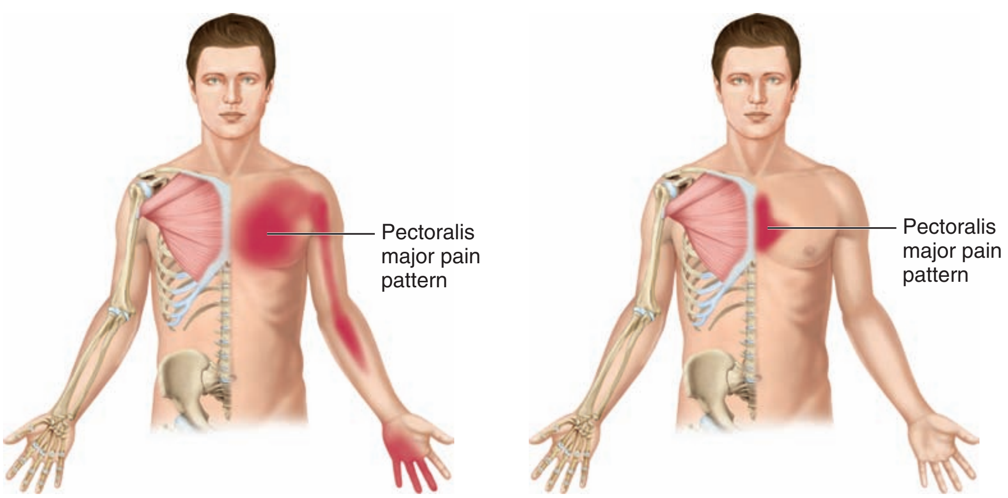


FIGURE 7.23 **Pectoralis Major Muscle and Referred Pain Patterns**

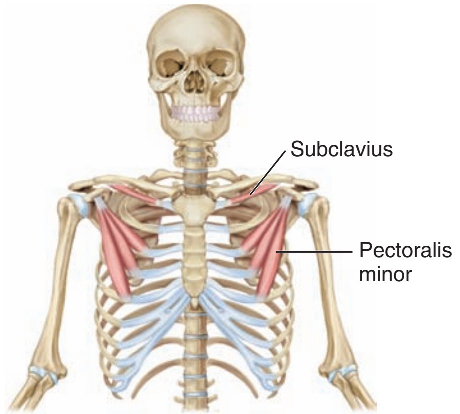


FIGURE 7.24 **Pectoralis Minor and Subclavius Muscles**

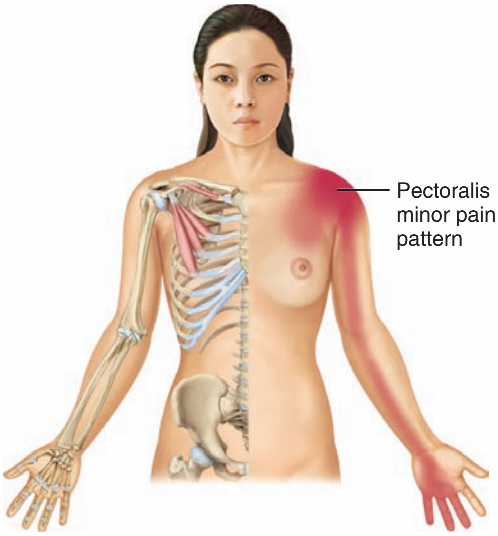


FIGURE 7.25 **Pectoralis Minor Muscle and Referred Pain Pattern**

SUBCLAVIUS, FIGURES 7.24 AND 7.26

ORIGIN	1st rib costocartilage junction
INSERTION	Middle third of inferior surface of clavicle
ACTION	Depression of shoulder; stabilization of clavicle during shoulder movement
MYOTOME	C5, C6

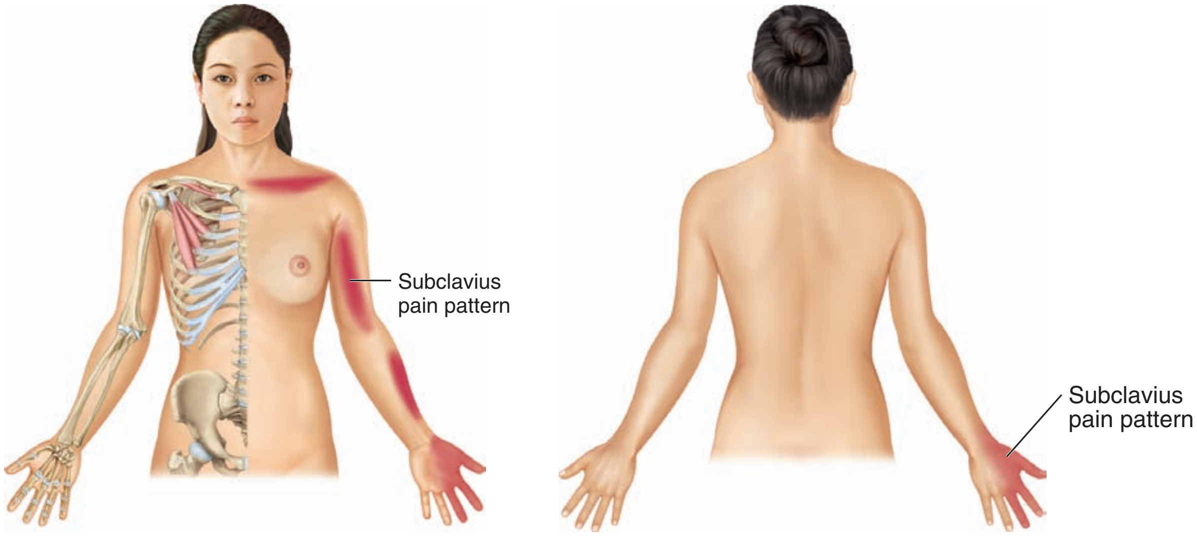


FIGURE 7.26 **Subclavius Muscle and Referred Pain Patterns**

CLINICAL NOTES: Pectoralis Major, Pectoralis Minor, and Subclavius

The pectoralis minor originates on the 3rd, 4th, and 5th ribs and attaches to the coracoid process of the scapula. The subclavius lies on the inferior surface of the clavicle, traveling most of its length and attaching to the 1st rib. The pectoralis major is superficial to both the pectoralis minor and the subclavius. There are three divisions of this muscle—clavicular, sternal, and costal—which originate at different locations, run in different directions, and insert at the same point: the bicipital groove of the humerus.

Because of the varied directions that its three divisions travel and their attachment on the humerus, the pectoralis major influences many movements of the humerus, including flexion, adduction, and medial rotation of the arm, as well as depression of the arm and shoulder. The pectoralis minor assists the serratus anterior in forced inspiration and contributes to protraction, depression, and downward rotation of the scapula. The subclavius stabilizes the clavicle and assists in depression of the shoulder.

Anterior shoulder pain, breast pain, and diffuse soreness are symptoms of trigger point pain referred by the pectoralis muscles. Pain in the shoulder that traces down the arm and into the hand could be a sign of thoracic outlet syndrome: a condition in which the cervical spine compresses toward the rib cage because of anterior cervical muscles' and the pectoralis minor's pulling the shoulder down from the front, thus narrowing the space between the cervical spine and the 1st rib. Also contributing to thoracic outlet syndrome is the latissimus dorsi's pulling the shoulder down from the back and, therefore, pulling the clavicle down and back against the 1st rib. These muscular imbalances can compress and entrap the neurovascular structures exiting and entering the neck, chest, and arm; if left untreated, they can lead to pain, motor weakness, immobility, and atrophy of the shoulder and upper extremity.

Dr. Janet Travell, coauthor of *Myofascial Pain and Dysfunction, Volume I,* refers to the pectoralis major as the "heart attack muscle." According to Travell, "cardiac arrhythmia" trigger points may be located on the right side, 1 inch lateral to the xiphoid process and 2 inches superior, between the 5th and 6th ribs. The referral pain from these trigger points can replicate the intensity, quality, and distribution of true cardiac pain.

Travell has a second nickname for the pectoralis major: the "poor posture muscle." A stooped posture is aggravated by the increased tension caused by myofascial trigger points in the pectoralis major muscle. Increased tension in the anterior torso muscles that results in stooped posture causes the rib cage to be pulled down and forward; this causes the pectoral muscles to adaptively shorten. This pulls the shoulders inward, rounding the shoulders. As this kinetic chain, initiated by the abdominals, shortens, the neck and head move forward and down, further shortening the anterior neck muscles. The farther the neck and head move forward off the gravitational line, the more the suboccipital muscles compress. This tightening at the base of the occiput is the body's last-ditch effort to hold the head upright, leveling the eyes to the horizon. Poor sitting postures arise from inadequate lumbar support. A lumbar support (e.g., a rolled-up towel placed in the small of the back) will cause the pelvis to rotate anteriorly, facilitating a lumbar curve and taking pressure off the lumbar disks. This natural curve (lordosis) will pull the upper body back on plane, increasing the natural curve of the neck and opening up the chest, thereby facilitating a more efficient posture.

The three divisions of the pectoralis major should be treated independently with treatment directed into the muscle bellies and toward their attachment on the humerus. Treatment to the pectoralis major should also include the subscapularis, latissimus dorsi, teres major, serratus anterior, and abdominal musculature in order to separate and identify any areas of restriction. *Note:* The chest wall is a highly sensitive area for most people; the cervical and axillary lymph nodes drain in the chest, where there can be metabolic waste accumulation, causing hypersensitivity.

ROUTINE: Pectoralis Major, Pectoralis Minor, and Subclavius

Position of client: supine, with the client's arm extended away from the body. Support the arm with an extended bolster if the arm does not fit on the table, but allow the client's hand to hang off the table. (See Figure 7.27.)

1. Treat the anterior torso compartment with slow, deep effleurage from the pubic bone, over the rib cage, and superiorly in a fan-shaped pattern through the sternal and pectoral region, ending at the clavicles.
2. Using the fingertips, apply compression and friction along the muscle fibers, separating the three muscular divisions of the pectoralis major.
3. Using the fingertips, slowly compress downward and apply slow, rhythmical friction to the pectoralis minor by treating the pectoralis major. (See Figure 7.28.)
4. Isolate the pectoralis major by picking it up, off the rib cage. Treat with compression. Using thumbs and fingers, friction in 1-inch segments. (See Figure 7.29.)
5. Using a collapsed fist, treat the pectoralis major from the sternum to the humerus with deep, slow effleurage.
6. Contour one hand along the lateral rib cage, and slowly apply inward compression into the pectoralis minor while the other hand lightly lifts the pectoralis major. (See Figure 7.30.)

FIGURE 7.27

FIGURE 7.28

7. Maintain the same contoured hand position. Glide superiorly toward the coracoid process while lifting the arm toward the ceiling and pulling it posteriorly to stretch the myofascia. Compress the fingers down on the pectoralis minor. Hold static compression in 1-inch segments. Use the edge technique for maintaining the client's comfort. (See Figure 7.31.)

Have the client move to the side-lying position to ensure that the pectoralis major is off the rib cage, exposing it and the pectoralis minor for treatment. Sit at the side of the table at the client's waist. Place the client's arm out in front of his or her body.

8. Place one hand around the client's scapula. Place the other hand underneath the client's arm, and grasp the pectoralis major. Treat with slow, firm petrissage, exploring the muscular divisions. (See Figure 7.32.) Face the palm toward the rib cage, and point the fingers inward. Separate the pectoralis major from the underlying pectoralis minor muscle, and slowly compress the pectoralis major in 1-inch segments. Move, and reenter the compression. Using a contoured hand, treat the pectoralis minor along the rib cage with compression and circular friction. Use the edge technique for maintaining the client's comfort. (See Figure 7.33.)

9. Allow the client's arm to roll forward so that the clavicle lifts off the upper ribs. Using the fingertips of one hand and the thumb of the other, treat the subclavius muscle underlying the clavicle with static compression. Apply friction in 1-inch segments. (See Figure 7.34.)

10. Using the fingertips, glide along the inferior border of the clavicle and re-treat the pectoralis major around the attachment and the subclavius muscle, as shown in Figure 7.34.

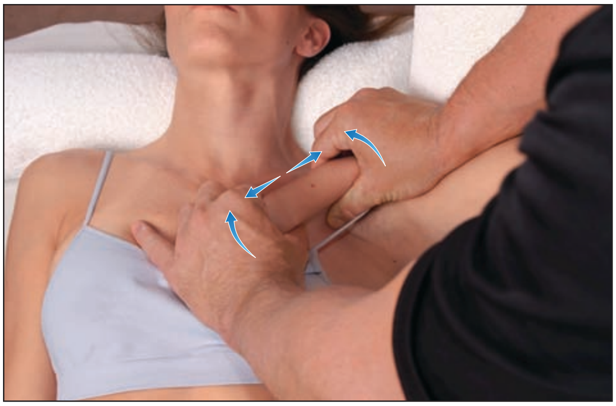


FIGURE 7.29

FIGURE 7.30

FIGURE 7.31

FIGURE 7.32

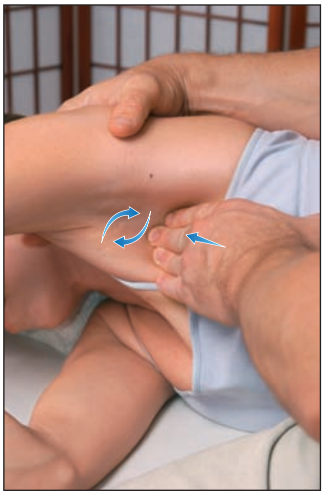


FIGURE 7.33

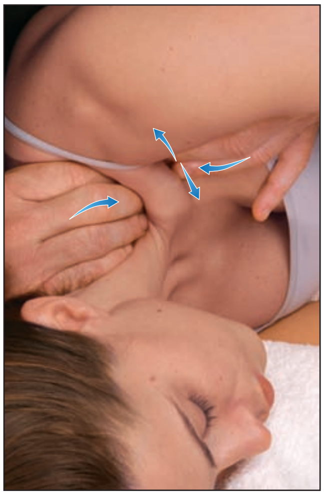


FIGURE 7.34

SERRATUS ANTERIOR, FIGURES 7.35 AND 7.36

ORIGIN	Upper nine ribs
INSERTION	Anterior vertebral border of scapula
ACTION	Protracts scapula; rotates scapula upward
MYOTOME	C5–C7

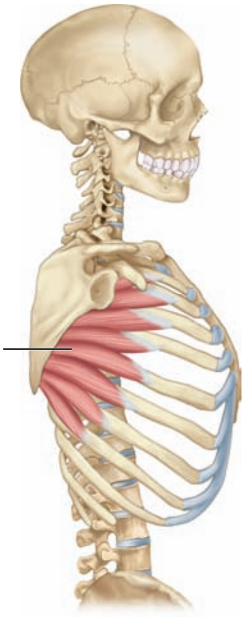


FIGURE 7.35 **Serratus Anterior Muscle**

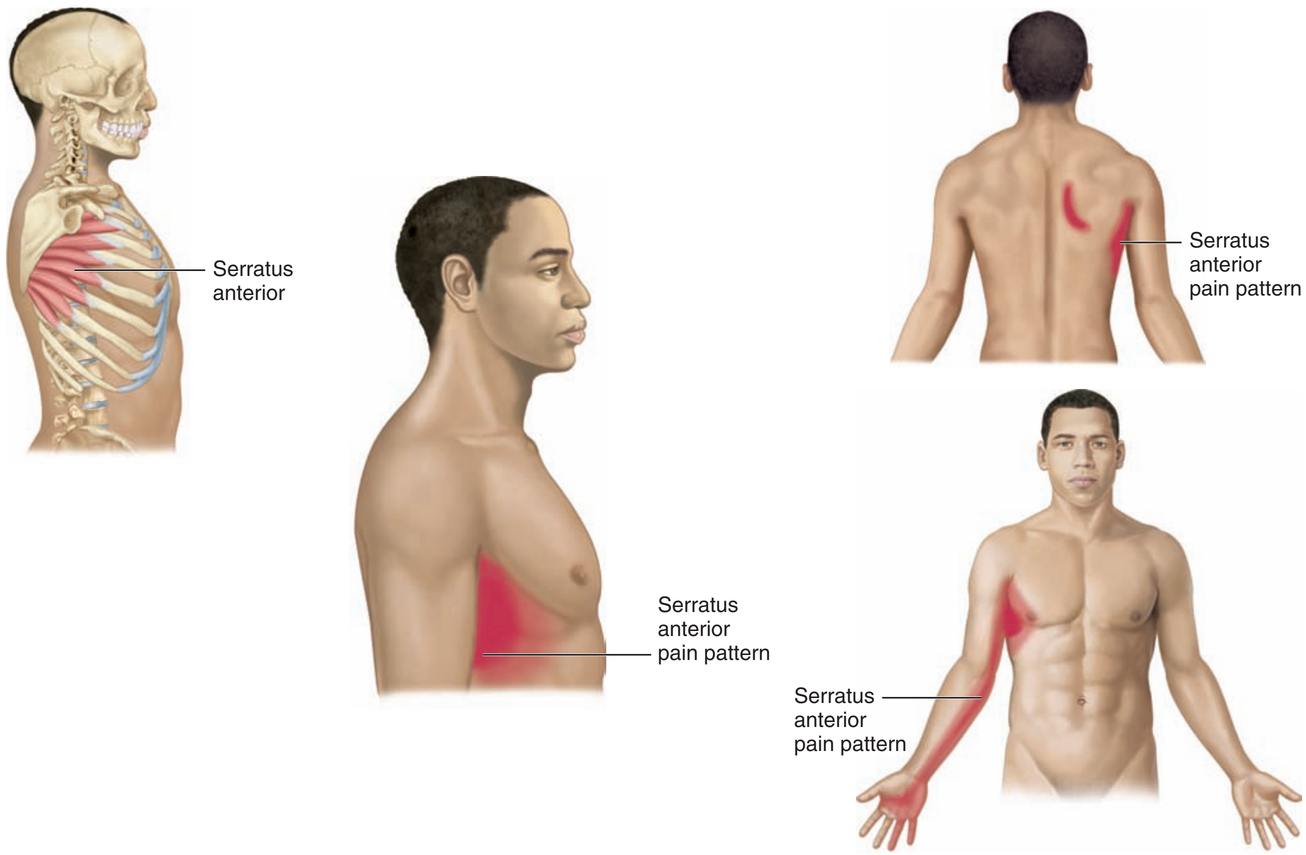


FIGURE 7.36 **Serratus Anterior Muscle and Referred Pain Patterns**

CLINICAL NOTES: Serratus Anterior

The serratus anterior anchors the scapula to the thorax, originating on the upper nine ribs and attaching on the entire anterior vertebral border of the scapula from the inferior angle to the superior angle. The lower fibers of the serratus anterior interdigitate with the upper fibers of the external oblique where they attach to the lower ribs. These fibers can pull the inferior angle of the scapula forward, causing the scapula to rotate upward elevating the shoulder girdle. From a posterior view, the vertebral border of the scapula will appear to protrude from the body.

The primary function of the serratus anterior is protraction of the scapula, assisted by the pectoralis minor and upper fibers of the pectoralis major. The serratus anterior also assists the upper fibers of the trapezius, rhomboids, and levator scapulae in elevating the scapula; therefore, an abnormally protracted or an elevated scapula may be a clinical indication for treating the serratus anterior muscle.

Shortening of the pectoralis major, pectoralis minor and the serratus anterior is often the result of stooped posture and can cause rounding of the shoulders, pain in the anterior and lateral chest wall, and a restricted expansion of the chest wall on inspiration. If the pain is perpetuated by a forced protraction of the shoulder, it is likely that the serratus anterior is involved.

ROUTINE: Serratus Anterior

Position of client: side-lying.

1. Using the fingertips, treat the lateral torso with slow, deep effleurage; stretching the myofascia from the iliac crest to the axilla, continuing to the olecranon processes of the ulna. (See Figure 7.37.)
2. With a contoured hand and the fingertips, glide along the rib cage, simultaneously compressing the serratus anterior onto the rib cage. (See Figure 7.38.) Position the other hand under the vertebral border of the scapula. Glide both hands toward each other, simultaneously lifting the scapula toward the ceiling. Perform movement palpation (protraction and retraction) of the scapula.
3. Using flexed fingertips, treat the underlying surface of the vertebral border of the scapula with friction in 1-inch segments. (See Figure 7.39.)
4. Using fingertips, treat along the upper nine ribs with compression and slow, deep effleurage. Then apply a broad, slow and isolated friction in 1-inch segments. (See Figure 7.40.)
5. Using the fingertips, treat the muscles along the lamina groove with friction while retracting the shoulder girdle for easier access. (See Figure 7.41.)

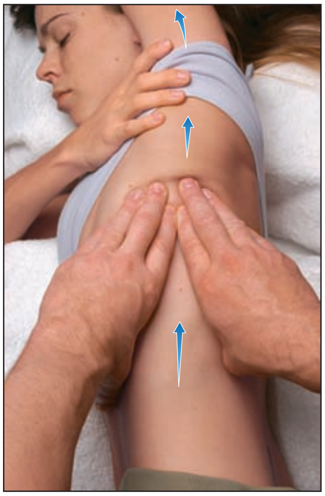


FIGURE 7.37

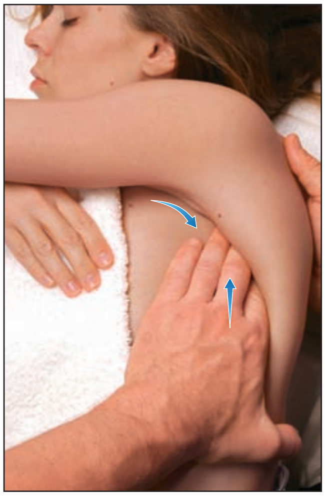


FIGURE 7.38

FIGURE 7.39

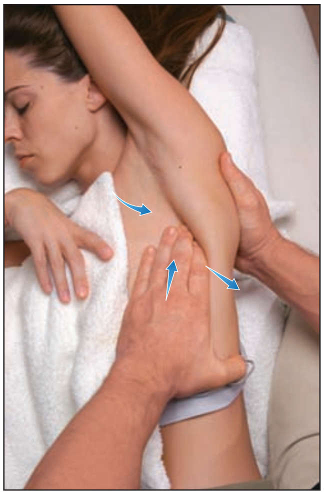


FIGURE 7.40

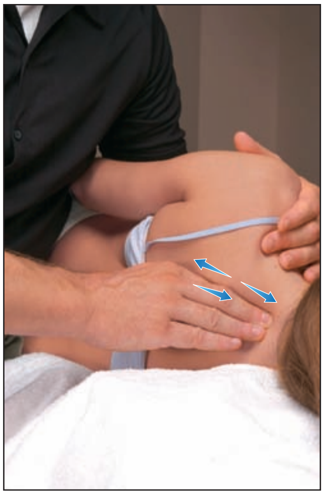


FIGURE 7.41

CERVICAL MUSCLES

Prior to treating the cervical muscles, treat the compartment distortions from the originating sources, which lead up to and affect the muscles of the neck.

Important: By now, a complete postural assessment and palpatory examination of the client's posture and compartment imbalances should have been done and understood. This helps to clarify the client's pain patterns and perpetuating factors, which provide the therapist with a specific plan of treatment, especially if the client's pain has been chronic. Chronic neck pain in the back of the neck is often experienced when a loss of cervical curve or straightening of the cervical spine is present. In severe cases the cervical spine actually reverses. The farther the spine straightens or reverses, the more downward force is applied to the disks in front. This causes the disks to migrate posterior and lateral, often protruding into the nerve roots where the nerves exit the neural foramina of the spine. The deep primary flexors and lateral flexors of the neck (longus colli, longus capitis, and scalenes), discussed in this chapter, are highly important to isolate and treat as it is *these* muscles that cause the majority of chronic neck and upper-extremity pain associated with loss of cervical curve. Treating the superficial muscles first and then the deeper primary flexors will allow for easier access into the deeper levels toward the vertebral bodies of the spine.

Chasing a client's pain (i.e., treating only where it hurts) often produces only temporary results. As stated above, the majority of people's pain is located in the back of the neck because of straightening of the spine and often a downward collapsed, stooped posture. Therefore, treating the secondary contractors, the ones resisting the primary contractors, will loosen them up only temporarily, and this will then cause the deeper anterior muscles to shorten even more, as they take up slack. Much of the time, it will even cause the pain to actually get worse. Treating the anterior neck muscles and then releasing the posterior suboccipitals will provide many positive benefits, such as restoring cervical lordosis, decompressing the spinal disks, putting the neck and head back on the proper plane (viewed from the side, ear over shoulder), freeing up the C1 and C2 suboccipital joints, and decreasing the intensity and frequency of the neck pain. Quite often, lengthening the hamstrings and abdominal muscles alone will upright the body significantly, thereby decreasing the cervical pain symptoms considerably.

STERNOCLEIDOMASTOID, FIGURES 7.42 AND 7.43

ORIGIN	1. Manubrium of the sternum; 2. medial clavicle
INSERTION	Mastoid process
ACTION	*Bilateral:* flexion of neck; elevation of sternum on deep inspiration
	Unilateral: lateral flexion of neck; rotation of head to opposite side
MYOTOME	C3, C4

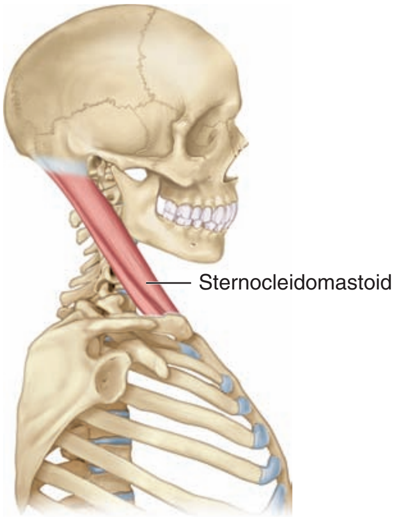


FIGURE 7.42 **Sternocleidomastoid Muscle**

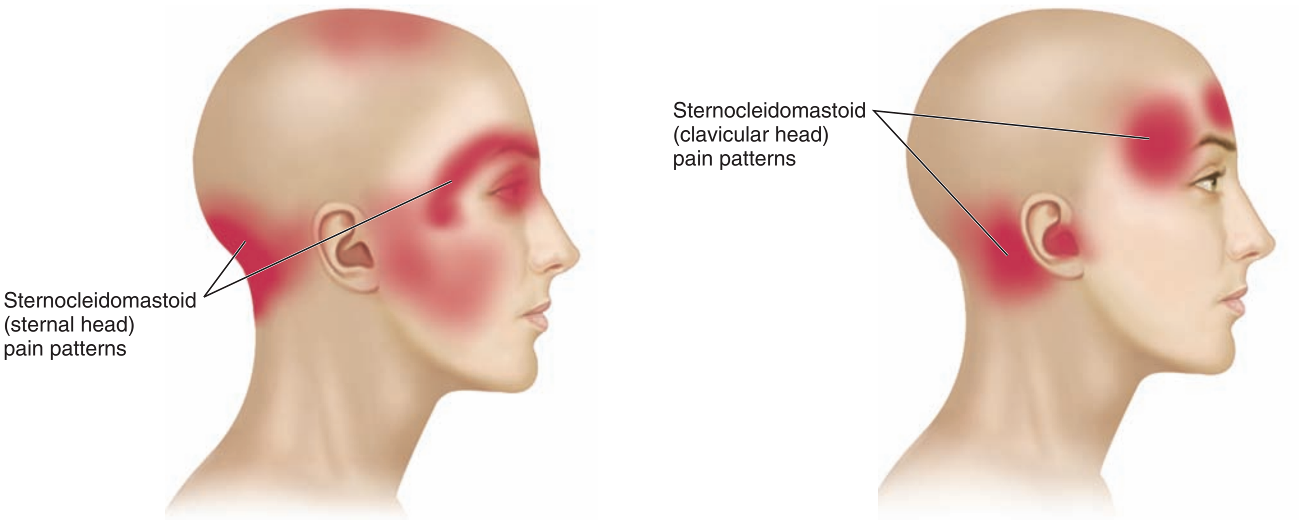


FIGURE 7.43 **Sternocleidomastoid Referred Pain Patterns**

CLINICAL NOTES: Sternocleidomastoid

The sternocleidomastoid muscle (SCM) is the largest and most superficial muscle of the anterolateral aspect of the neck. The SCM has two distinct sections, sternal and clavicular, that merge approximately halfway to a common attachment on the mastoid process of the temporal bone. The sternal section originates on the manubrium of the sternum; the clavicular section originates 1 inch laterally on the clavicle. The clavicular section is wider, thicker, deeper, and harder to palpate.

The SCM muscles are synergistic and antagonistic to themselves. Bilaterally, they flex the neck and act as elevators of the upper thorax on forced inspiration. Unilaterally, the SCM rotates the head toward the opposite side. Working together as a unit, the SCM and trapezius muscles laterally flex the neck, drawing the ear down to the shoulder of the same side. Common distortions such as depressed or elevated shoulder girdles, leg-length deviations, and pelvic distortions can cause these muscles to work overtime to compensate.

Pain patterns of the SCM muscle frequently include multiple referral zones to the face and head. Referral pain from the clavicular section may occur independently of referral pain from the sternal section. Trigger points in the sternal section of the SCM typically cause migraine arc pain above the eyes that travels laterally through the sinuses and spills downward to the face, cheek, and temporomandibular joint region. A person with these symptoms may also be medically diagnosed with atypical facial neuralgia or tension headache. Trigger points of the clavicular section of the SCM typically refer pain deep within the ear and may cause dizziness, disturbed equilibrium, and vertigo.

Treatment of the SCM should include restoring an upright body posture and treating any and all muscles that restrict full cervical range of motion. A treatment plan should also include daily stretching and range-of-motion exercises as well as proper evaluation and correction of postural supports. This may include adequate head, neck, and lumbar support and/or a good pillow for sleeping. Elimination of excessive neck rotation and forward head positioning is crucial for maintaining stability and strength of the neck muscles.

ROUTINE: Sternocleidomastoid

Position of client: supine. Stand or sit at the head of the therapy table.

1. Using the fingers, glide in a superior direction and explore the intermuscular septum between the sternal and clavicular divisions of the SCM muscle. With the fingers pointing inward, treat the intermuscular septum on the medial and lateral borders of the SCM. (See Figure 7.44.)
2. Using flexed fingers of both hands, penetrate under the lateral borders of the SCM's and apply light, static compression onto the anterior tubercles of the spine moving in 1-inch segments. These compressions are for examining and treating the deeper neck flexors that lie and attach under the SCM's. This examination will reveal the amount of tautness within the SCM's and the deeper flexors of the cervical spine. The amount of tautness revealed, will determine the amount of time needed for treatment. (See Figure 7.45.)
3. Isolate the sternal head of the SCM. Pick up and compress the fibers, moving superiorly in 1-inch segments. (See Figure 7.46.)

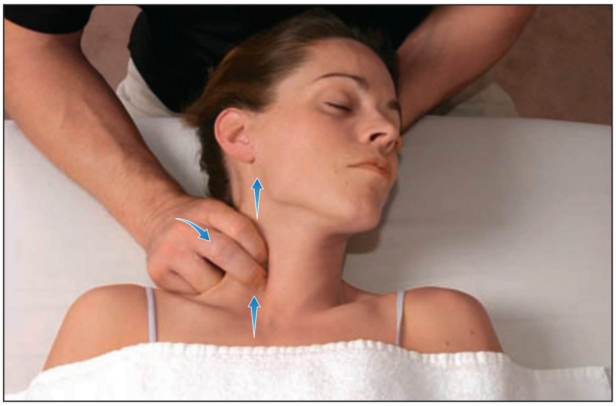


FIGURE 7.44

FIGURE 7.45

4. Isolate the clavicular head of the SCM. Pick up and compress the fibers, moving superiorly in 1-inch segments. Using one hand, cradle the client's head, rotate it away from the treatment side, and lift it toward the ceiling at a 45-degree angle. (See Figure 7.47.)
5. Using the fingertips of the other hand, rake into the SCM fibers beginning at the merge of the two heads, approximately two-thirds up the muscle. Glide superiorly up to and over the mastoid process. This will ensure a thorough treatment to the deep fibers that could be harboring trigger points and would likely not have been isolated using standard compression. (See Figure 7.48.) Glide 6 to 10 times.
6. Using a contoured index finger, friction the mastoid process in all directions. (See Figure 7.49.)

FIGURE 7.46

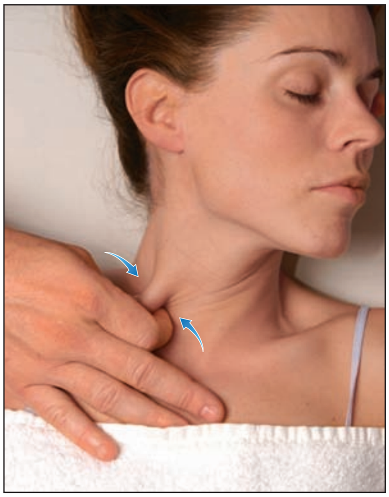


FIGURE 7.47

FIGURE 7.48a

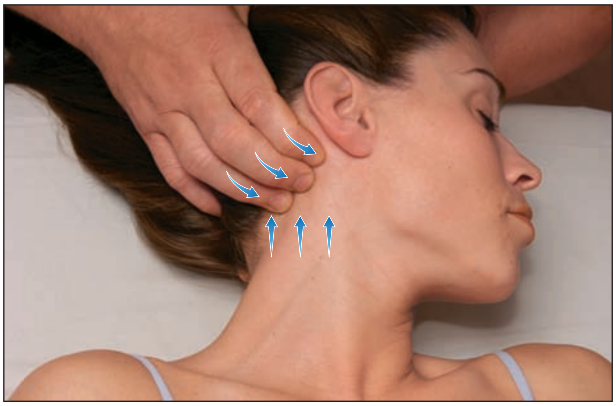


FIGURE 7.48b

FIGURE 7.49

ANTERIOR CERVICALS—SUPERFICIAL: SUPRAHYOIDS

MYLOHYOID, FIGURES 7.50 AND 7.51

ORIGIN	Inside surface of mandible
INSERTION	Hyoid bone
ACTION	Elevates hyoid bone; raises floor of mouth and tongue
MYOTOME	C1–C3, facial nerves

DIGASTRIC, FIGURES 7.50 AND 7.51

ORIGIN	Inside surface of mandible; mastoid process of temporal bone
INSERTION	Intermediate tendon attached to hyoid bone and inside surface of mandible
ACTION	Raises hyoid bone; assists in opening jaw; moves hyoid bone forward or backward
MYOTOME	C1–C3, facial nerves

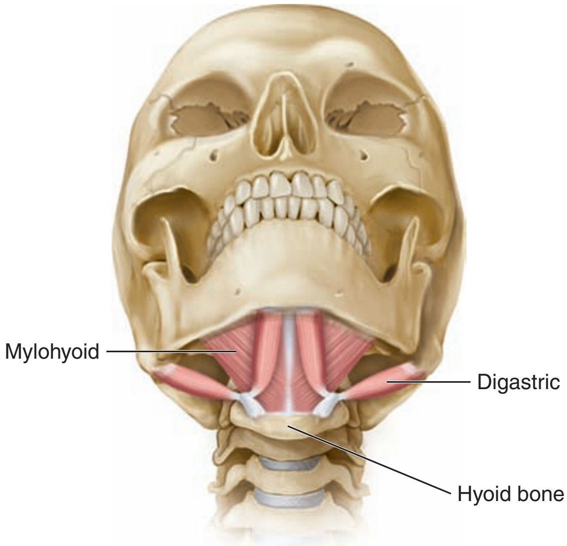


FIGURE 7.50 **Anterior Cervicals—Suprahyoid Muscles: Mylohyoid and Digastric**

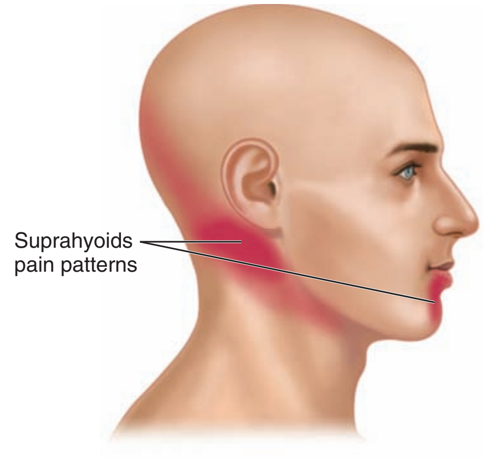


FIGURE 7.51 **Suprahyoid Referred Pain Patterns**

ANTERIOR CERVICALS—SUPERFICIAL: INFRAHYOIDS

GENIOHYOID, FIGURE 7.52

ORIGIN	Inside surface of mandible
INSERTION	Hyoid bone
ACTION	Protracts hyoid bone and tongue
MYOTOME	C1–C3, facial nerves

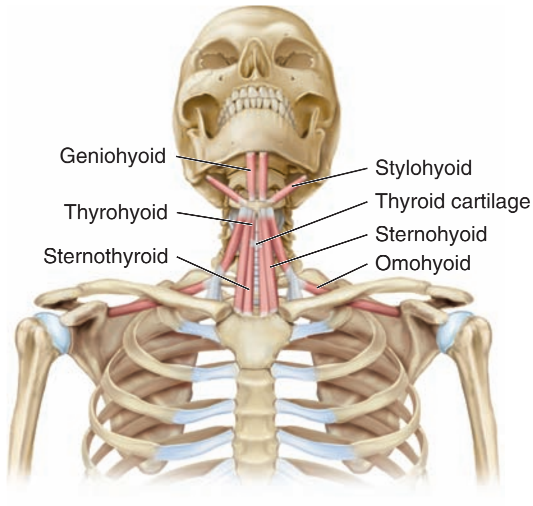


FIGURE 7.52 **Anterior Cervicals—Infrahyoid Muscles: Geniohyoid, Stylohyoid, Thyrohyoid, Sternohyoid, Sternothyroid, and Omohyoid**

STYLOHYOID, FIGURE 7.52

ORIGIN	Styloid process of temporal bone
INSERTION	Hyoid bone
ACTION	Retracts hyoid bone; elevates tongue
MYOTOME	C1–C3, facial nerves

THYROHYOID, FIGURE 7.52

ORIGIN	Lamina of thyroid cartilage
INSERTION	Hyoid bone
ACTION	Depresses hyoid or elevates thyroid cartilage
MYOTOME	C1

STERNOHYOID, FIGURE 7.52

ORIGIN	Medial end of clavicle, manubrium of sternum
INSERTION	Hyoid bone
ACTION	Depresses hyoid
MYOTOME	C1–C3

STERNOTHYROID, FIGURE 7.52

ORIGIN	Manubrium of sternum
INSERTION	Lamina of thyroid cartilage
ACTION	Depresses hyoid or depresses thyroid cartilage
MYOTOME	C1–C3

OMOHYOID, FIGURE 7.52

ORIGIN	Superior border of scapula near scapular notch
INSERTION	Hyoid bone via central tendon on clavicle
ACTION	Depresses hyoid bone
MYOTOME	C2, C3

ANTERIOR CERVICALS—DEEP

LONGUS COLLI, FIGURES 7.53 AND 7.54

ORIGIN	Multiple attachments from C3–T2 vertebral bodies and transverse tubercles
INSERTION	Multiple attachments from C3–T2 vertebral bodies and transverse tubercles
ACTION	Flexes cervical spine
MYOTOME	C2–C7

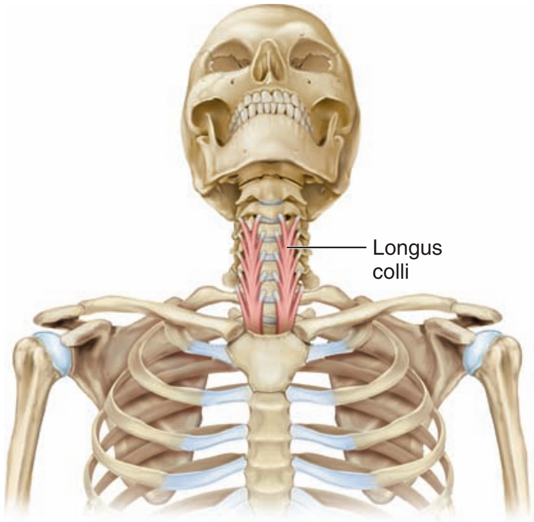


FIGURE 7.53 **Anterior Cervicals—Longus Colli Muscles**

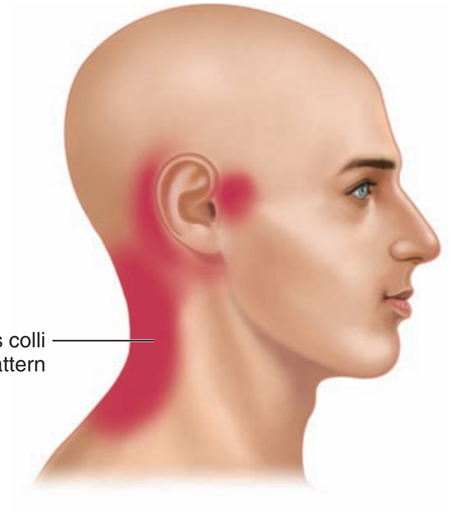


FIGURE 7.54 **Anterior Cervicals—Longus Colli Referred Pain Pattern**

LONGUS CAPITIS, FIGURES 7.55 AND 7.56

ORIGIN	Transverse tubercles of C3–C6
INSERTION	Occipital bone, anterior to foramen magnum
ACTION	Flexes head
MYOTOME	C1–C3

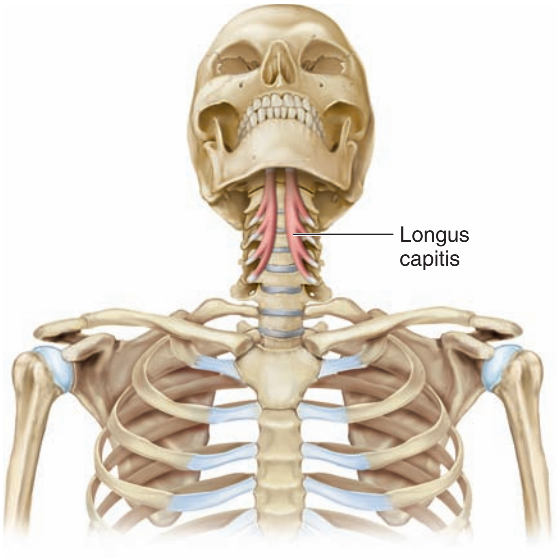


FIGURE 7.55 **Anterior Cervicals—Longus Capitis Muscles**

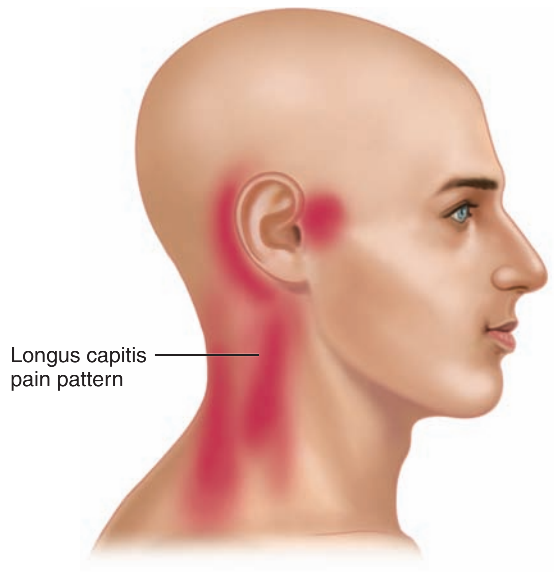


FIGURE 7.56 **Anterior Cervicals—Longus Capitis Referred Pain Pattern**

CLINICAL NOTES: Anterior Cervicals

The superficial anterior cervical muscles include the suprahyoids and the infrahyoids, which attach to multiple attachments ranging from the hyoid bone and mandible (inner surface) to the mastoid process, styloid process, thyroid cartilage, manubrium of the sternum, and scapula (superior scapular notch). The longus capitis and longus colli run deep to all of these, with attachments from the occipital bone to T2. The suprahyoids and infrahyoids influence movement of the hyoid. The longus colli and longus capitis muscles are the prime flexors of the neck and head and are frequently the root cause of neck pain and cervical joint restriction. The longus colli and longus capitis connect the head to the upper thoracic spine and initially shorten when the space between the pelvis and the rib cage shortens. This all, of course, stems from short hamstrings posteriorly rotating the pelvis—flattening the lumbar spine—and the abdominals shortening the rib cage and collapsing it forward, causing stooped posture and FHP. As the neck and head get pulled forward and down, the posterior suboccipitals countertighten, rocking the head back upright and leveling the eyes to the horizon. The farther the neck and head project forward and down, the more compression occurs at the C1 and C2 joints, thereby restricting cervical motion. When the longus colli and capitis shorten, hyperextension becomes restricted and painful. Shortening of the longus colli and longus capitis that flexes the spine and head has the direct ability to shorten the spaces between the vertebral bodies and compress the lower cervical disks. Arthritic spurring and disk degeneration can be the result of chronic hypertonicity of these muscles. If pain is chronic and persistent, or motor weakness, burning, tingling, or numbness is experienced, or radiating pain refers down the arm, it is good practice to refer the client to his primary care physician for a complete diagnostic evaluation.

Throat pain, difficulty swallowing, and the feeling of a "knot" in the throat are some symptoms of chronic shortening and/or improper healing after an injury of the anterior cervicals. When a person sustains a whiplash injury, small micro-tears can occur in these muscles. A cervical strain or sprain is the common diagnosis. Quite frequently, whiplash injuries, especially those that occur when a person gets hit from behind, will cause the head to buckle back, straining the anterior cervical muscles. In response, the muscles spasm straightening the cervical curve. Quite often, the deep anterior neck flexors go untreated, and the body heals in a straight and sometimes reversed position. The anterior cervicals should be addressed in treatment to avoid healing in a locked-short position. The anterior cervicals should always be examined and treated when there has been surgical intervention (e.g., disk surgery or tracheotomy).

Include the suprahyoids and infrahyoids in the treatment plan. It is necessary to thoroughly release these muscles before attempting to displace the trachea and treat the longus colli and longus capitis.

ROUTINE: Anterior Cervicals

Position of client: supine.

1. Treat the fascia of the anterior and lateral neck for 5 minutes. Use fascial stretching and rolling techniques. (See Figure 7.57.) (The musculature thickens as multiple tendons merge in a 1-inch diameter in the area of the 1st cervical vertebrae and mastoid and styloid processes.) Using the index finger, treat the fascia in and around the ear with friction. Displace the ear to thoroughly treat the mastoid process and cranial fascia throughout the occipital and temporal bones.
2. Assess the tension of the suprahyoids and infrahyoids by gently moving the trachea and hyoid bone back and forth. (See Figure 7.58.)
3. Isolate the sternohyoid and sternothyroid by picking up these superficial muscles at midline. Using the fingertips and thumbs, treat the muscles from superior to inferior with compression and friction. (See Figure 7.59.)

FIGURE 7.57

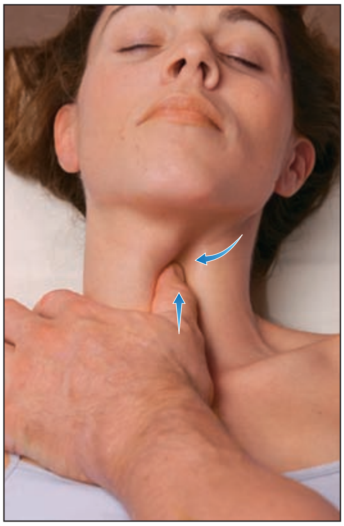


FIGURE 7.58

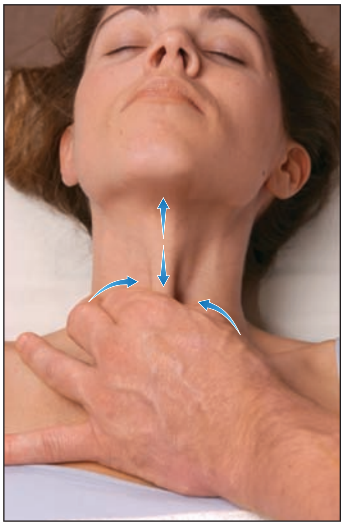


FIGURE 7.59

4. Stabilize the trachea and hyoid bone with one hand. Using the index finger of the other hand, treat the infrahyoid muscles on the cartilaginous portion of the trachea from lateral to medial with cross-fiber friction. Continue cross-fiber friction moving in a superior direction. Isolate the tracheal notch and hyoid bone. Continue treatment from lateral to medial until the entire surface of the hyoid bone is treated. Using a flexed index finger, treat underneath the hyoid bone with friction. (See Figure 7.60.)
5. Using the fingertips, treat the attachments of the suprahyoids directly above the hyoid bone from lateral to medial with cross-fiber friction. (See Figure 7.61.) Compressions should be made slowly and precisely for ensuring client's comfort. Utilize the "minimum" edge technique when treating the deeper anterior muscles of the neck. No pain means more gain.

   A slight cervical extension will allow easier access to and better treatment of the longus colli and longus capitis muscles. (See Figure 7.62.)
6. To treat the longus capitis, it is necessary to displace the trachea. This is a bilateral treatment. To treat the client's left side, anchor the left index finger on the right side of the client's mandible and move the trachea with the left thumb. If the skin is too taut to penetrate after moving the trachea to one side, try gathering some connective tissue toward the side being treated before displacing the trachea. (See Figure 7.63.)
7. Stabilize the trachea in its displaced position with the left thumb. Using the right thumb or index finger, compress the longus colli and longus capitis muscles against the anterior vertebral bodies and cervical disks. (See Figure 7.64.)
8. Using both index fingers, effleurage the longus colli and longus capitis muscles just lateral to the midline. (See Figure 7.65.)
9. Using the right thumb or index finger, treat the anterior longitudinal ligament, longus colli, and longus capitis with cross-fiber friction. (See Figure 7.66.) This is done with a focused intent and should not be painful.

Position: Change direction and stand at the head of the table.

10. Lift the client's head, and flex the neck and head forward. With the left thumb or index finger, compress and hold static compression to the longus colli and longus capitis muscles from the midline to the anterior tubercles, increasing the cervical extension with each compression. (See Figure 7.67.)
11. After treating the superficial and deep anterior cervical muscles, stretch the muscles by cupping the hands under the neck at the lowest level of C7 and T1. Pull the cupped hands toward the ceiling, and stretch the anterior

FIGURE 7.60

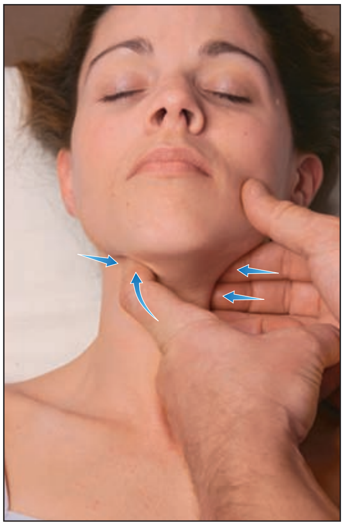


FIGURE 7.61

FIGURE 7.62

cervical muscles. This specific stretch will assist in restoring the cervical curvature, as well as decreasing the compression effect on the cervical disks. (See Figure 7.68.) This is a slow, non-forceful stretch. The client should experience no pain when administering this stretch. Stretching while maintaining the client's "minimal"edge will assure no discomfort to the client; it is the client who lets go, not the therapist forcing the stretch.

12. Repeat steps 6 to 11 on the client's right side.

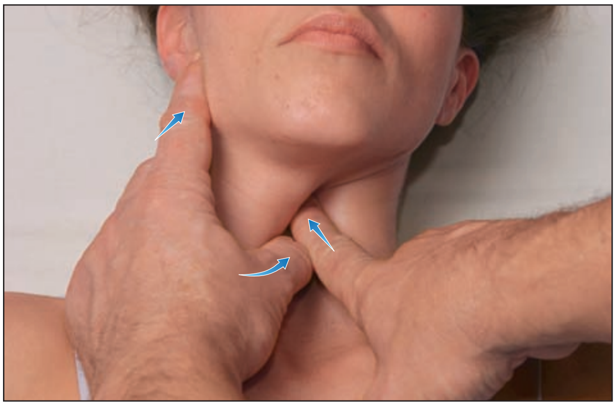


FIGURE 7.63

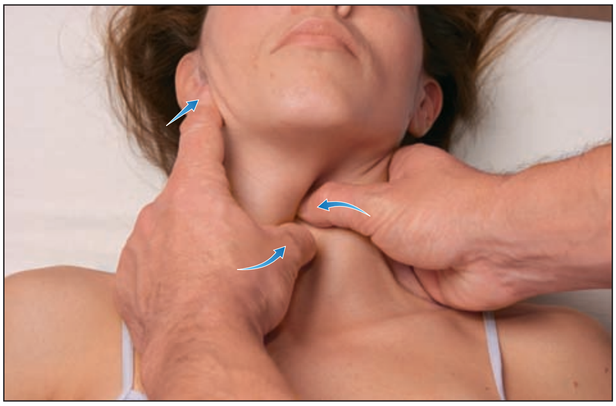


FIGURE 7.64

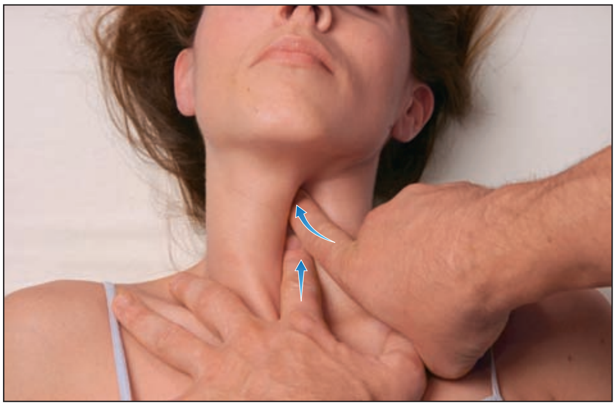


FIGURE 7.65

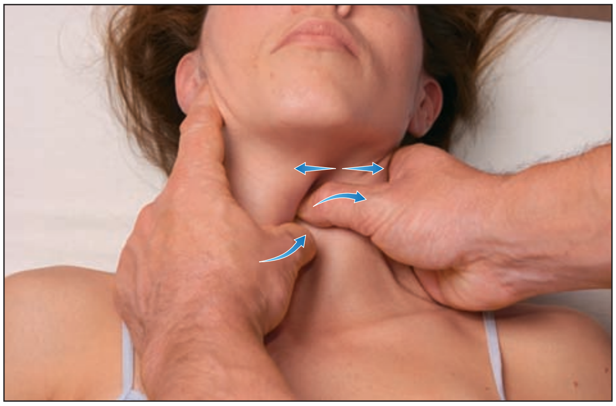


FIGURE 7.66

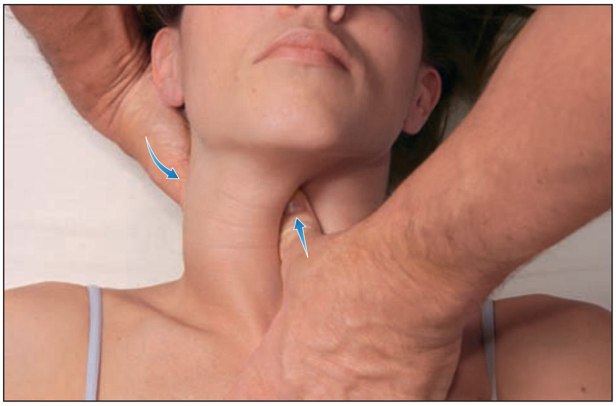


FIGURE 7.67

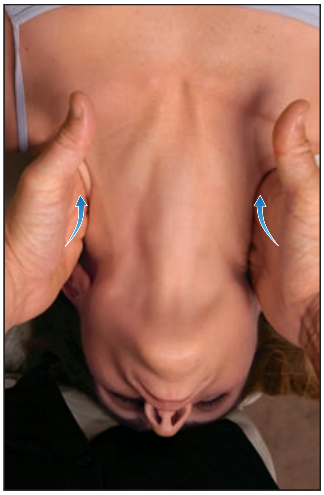


FIGURE 7.68

SCALENES

SCALENUS ANTERIOR, FIGURES 7.69 AND 7.70

ORIGIN	Anterior tubercles of cervical vertebrae C3–C6
INSERTION	1st rib
ACTION	Flexion and lateral flexion of neck; rotation of neck; elevation of 1st rib on deep inspiration
MYOTOME	C3–C5

SCALENUS MEDIUS, FIGURES 7.69 AND 7.70

ORIGIN	Anterior tubercles of cervical vertebrae C2–C7
INSERTION	1st rib
ACTION	Flexion and lateral flexion of neck; rotation of neck; elevation of 1st rib on deep inspiration
MYOTOME	C3–C5

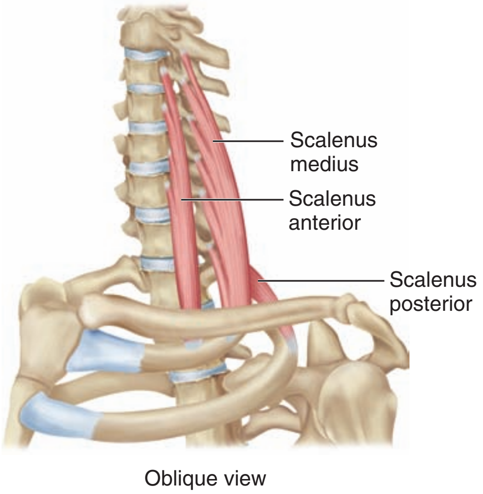


FIGURE 7.69 **Scalene Muscles: Scalenus Anterior, Scalenus Medius, and Scalenus Posterior**

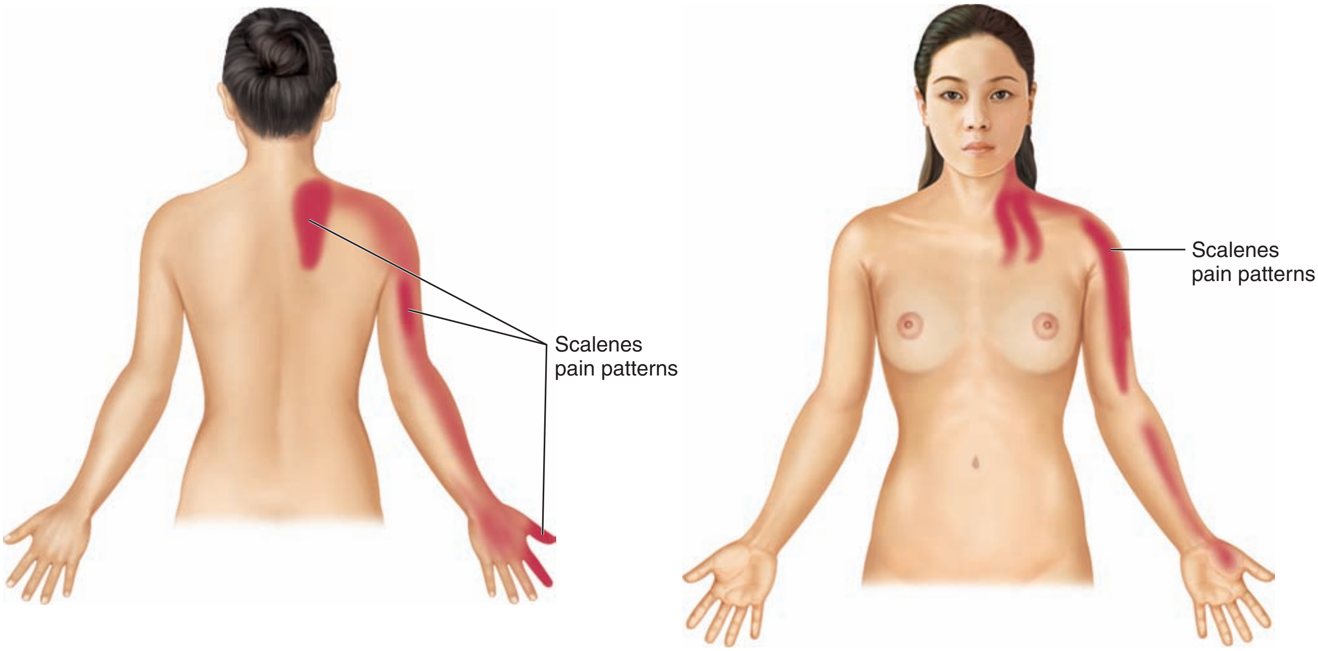


FIGURE 7.70 **Scalene Referred Pain Patterns**

SCALENUS POSTERIOR, FIGURES 7.69 AND 7.70

ORIGIN	Posterior tubercles of cervical vertebrae C5–C7
INSERTION	2nd rib
ACTION	Flexion and lateral flexion of neck; rotation of neck; stabilization of base of neck; raises 2nd rib on deep inspiration
MYOTOME	C3–C5

CLINICAL NOTES: Scalenes

The scalene muscle group originates on the cervical vertebrae and inserts on the 1st and 2nd ribs. Acting unilaterally, the scalene muscles serve as prime movers for lateral flexion of the cervical spine. Acting bilaterally, the scalenes assist the longus colli in neck flexion. The scalenes also participate in neck rotation and respiration.

In most conventional medical practices, the scalene muscle group is often overlooked as a source of pain along the upper vertebral border of the scapula and upper extremity. Although the primary symptom of a hypertonic scalene muscle is myofascial pain, according to Travell (whose nickname for the scalene muscles is "entrapper"), symptoms arising from ischemic and hypertonic scalene muscles can perpetuate neurovascular and brachial plexus entrapment. Neurovascular entrapment and/or compression can produce pain and swelling of the entire upper extremity, including the hand and fingers.

Chronic unilateral contraction of the scalene muscles is primarily due to asymmetry elsewhere in the body, such as leg-length deviation, pelvic distortion, scoliosis, or a tilted shoulder girdle.

ROUTINE: Scalenes

Note: If the client experiences an electriclike shock during this treatment, reposition the flexed fingers on the posterior tubercles. An electriclike shock is a neurologic sign that an intrusion has occurred on the nerve roots of the brachial plexus that exit the spine between the anterior and posterior tubercles.

Position of client: side-lying, with the client's arm extended. (See Figure 7.71.) This position ensures that the clavicle is off the rib cage and that the scalene muscles are exposed for treatment. Stand behind the client, and use both hands to reach over the client's body in the proximity of the cervical spine.

1. Using one hand, grasp the SCM muscle and move it toward the therapy table. Using the other hand, penetrate under the SCM muscle, moving medially until the anterior vertebral bodies are reached. Using the fingertips, treat the attachments of the anterior scalene on the tubercles with compression and slow subtle friction from C3 to C7. (See Figure 7.72.)
2. Using the fingertips, continue the compressions and friction, moving posteriorly approximately ¼ inch to ½ inch to treat the medial and posterior scalene attachments on the anterior and posterior tubercles.
3. Using the fingertips, penetrate under the clavicle as far inferior as possible to influence the deeper fibers of the scalenes toward the 1st and 2nd ribs. (See Figure 7.73.) Utilize the "minimum" edge to ensure client's comfort.

FIGURE 7.71

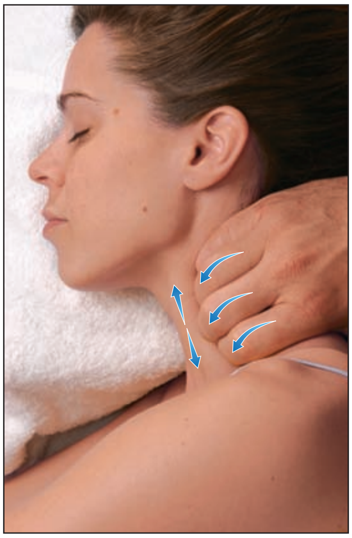


FIGURE 7.72

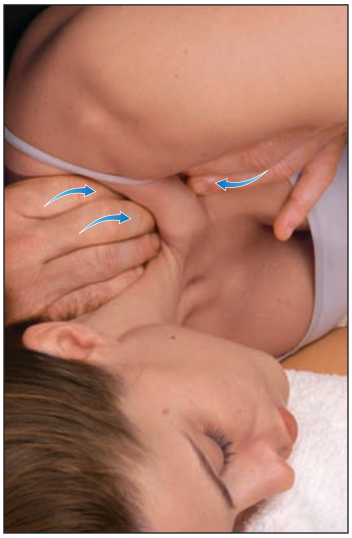


FIGURE 7.73

Ensure the client's comfort by treating slowly and precisely. If a pulse is palpated, reposition the fingers. A palpated pulse is a sign that the carotid artery has been penetrated. Do not stimulate these or other neurovascular structures of the body.

Position of client: supine.

Pick up the client's head and cup it in the hand. Rotate the head away from the side being treated, and elevate it approximately 45 degrees.

4. Lightly place the thumb of the other hand between the sternal and clavicular tendons of the sternocleidomastoid muscle, just above the clavicle. Using the thumb, treat the scalenes with slow, static compression. (See Figure 7.74.)
5. Continue with thumb and glide superiorly along the anterior tubercles up to the point where the heads of the SCM merge. (See Figure 7.75.)
6. Using flexed fingers, continue to treat the scalenes where they lie under the SCM muscle with compressions and 1-inch glides. (See Figure 7.76.) Release the compression, move, then reenter with compression, and continue 1-inch glides until the entire scalene attachments and bellies have been treated.

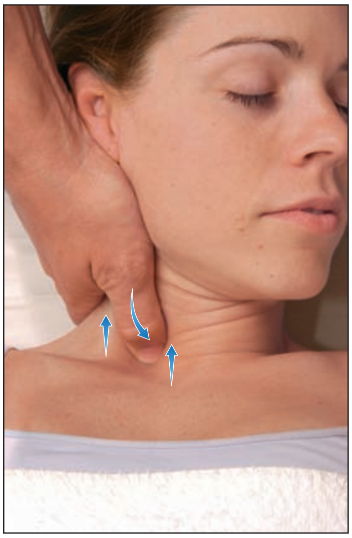


FIGURE 7.74

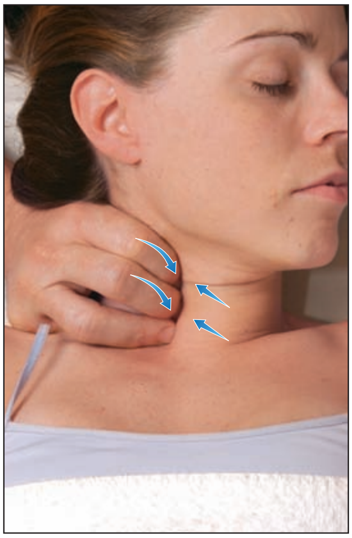


FIGURE 7.75

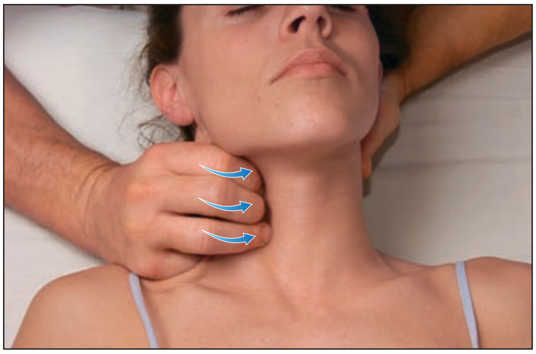


FIGURE 7.76

TEMPOROMANDIBULAR JOINT

MASSETER, FIGURES 7.77 AND 7.78

ORIGIN	Zygomatic arch
INSERTION	Angle of mandible (outer surface)
ACTION	Closes lower jaw; clenches teeth
MYOTOME	5th cranial nerve (trigeminal)

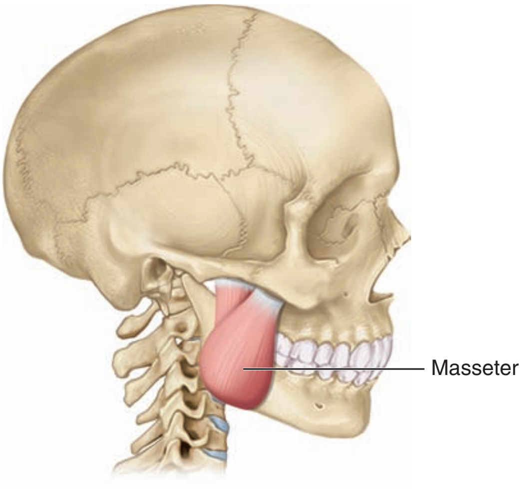


FIGURE 7.77 **Masseter Muscle**

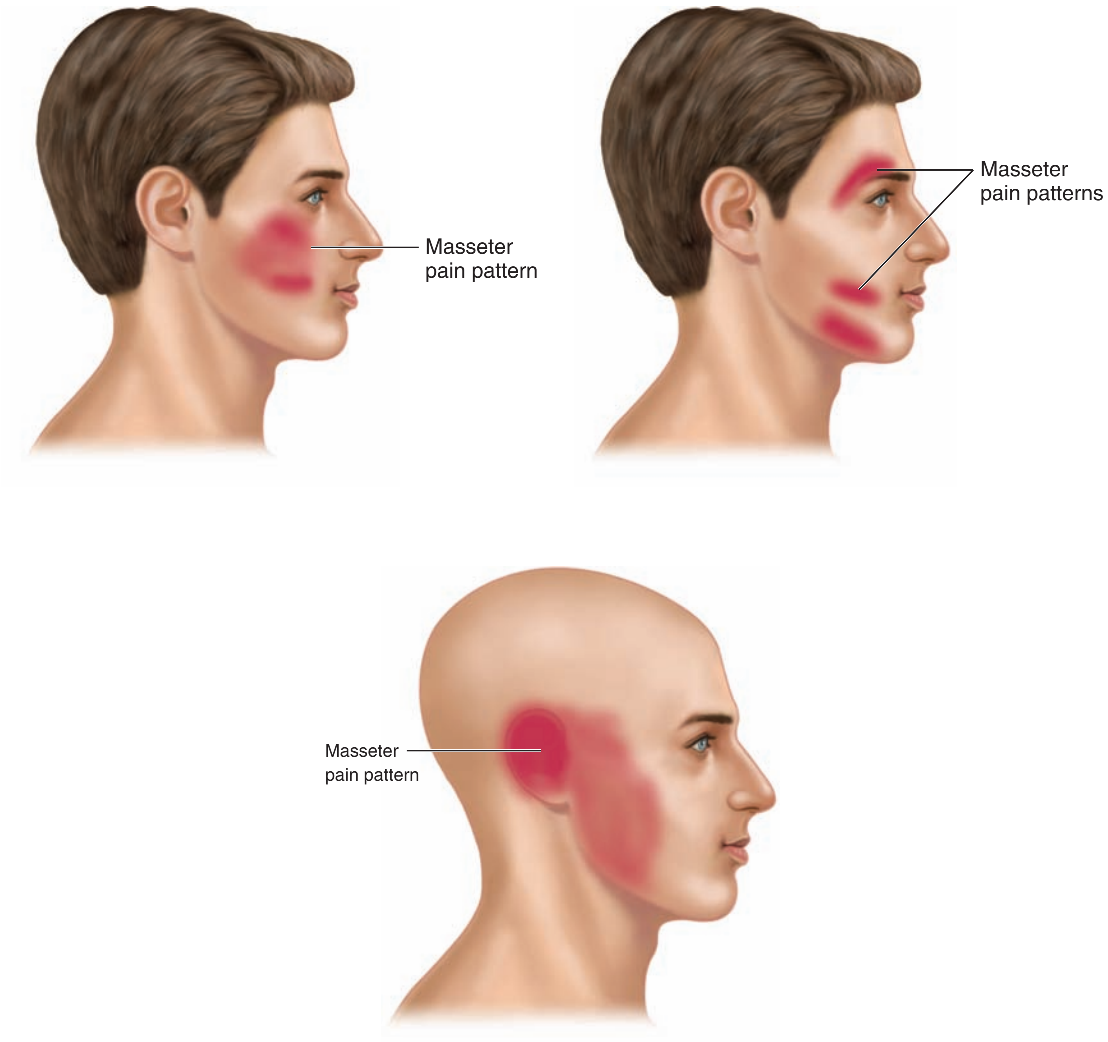


FIGURE 7.78 **Masseter Referred Pain Patterns**

TEMPORALIS, FIGURES 7.79 AND 7.80

ORIGIN	Temporal bone
INSERTION	Coronoid process of mandible
ACTION	Closes jaw; clenches teeth
MYOTOME	5th cranial nerve (trigeminal)

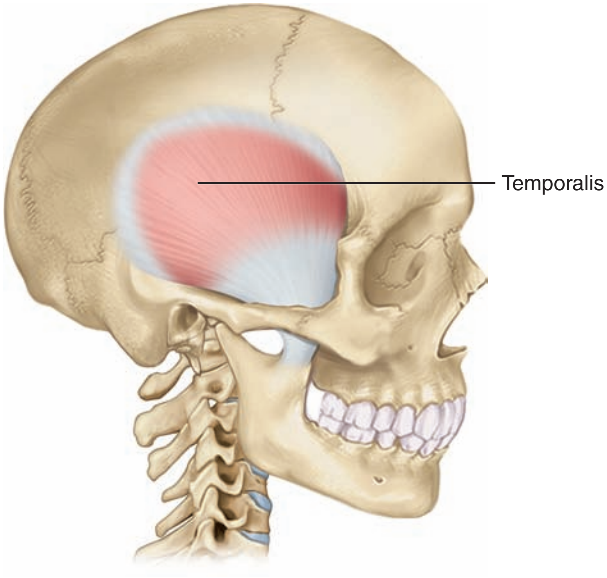


FIGURE 7.79 **Temporalis Muscle**

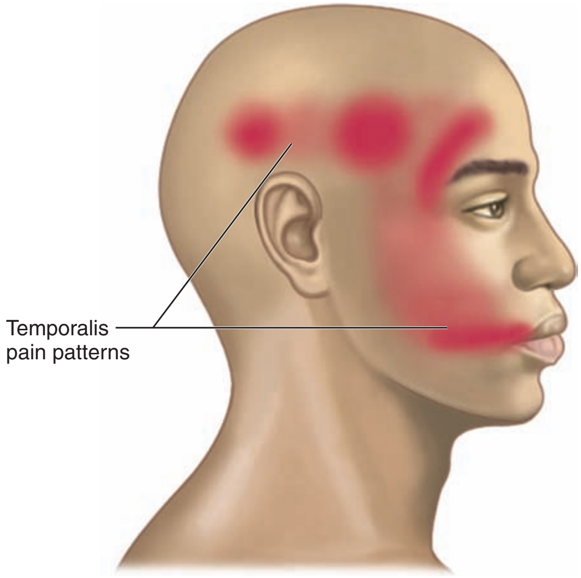


FIGURE 7.80 **Temporalis Referred Pain Patterns**

MEDIAL PTERYGOID, FIGURES 7.81 AND 7.82

ORIGIN	Medial pterygoid plate of sphenoid bone
INSERTION	Angle of mandible (inner surface)
ACTION	Closes lower jaw; clenches teeth; deviates jaw to opposite side
MYOTOME	5th cranial nerve (trigeminal)

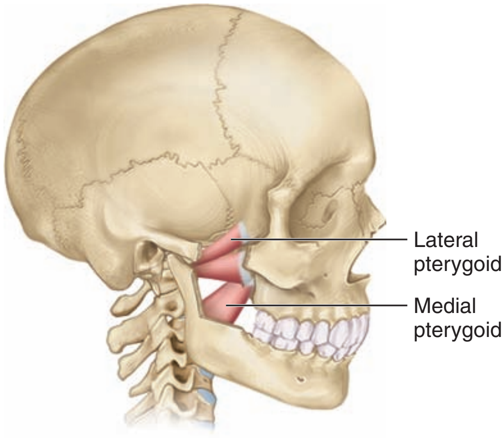


FIGURE 7.81 **Pterygoid Muscles: Medial and Lateral**

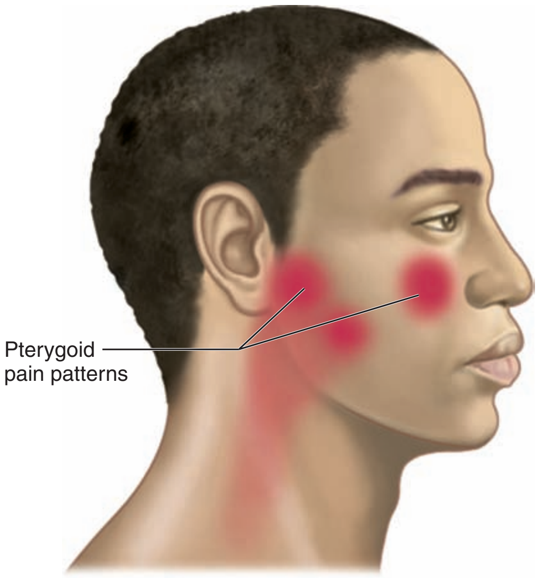


FIGURE 7.82 **Pterygoid Referred Pain Pattern**

LATERAL PTERYGOID, FIGURES 7.81 AND 7.82

ORIGIN	Lateral pterygoid plate of sphenoid bone
INSERTION	Mandibular condyle, temporomandibular joint capsule, and articular disk
ACTION	Opens jaw; protracts mandible; deviates jaw to opposite side
MYOTOME	5th cranial nerve (trigeminal)

CLINICAL NOTES: Temporomandibular Joint

The temporomandibular joint (TMJ) is the articulation between the condyle of the mandible and the squamous portion of the temporal bone. It is the only bilateral joint in the body. The masseter, temporalis, medial pterygoid, and lateral pterygoid contribute to its function and facilitate the opening and closing of the jaw.

All of these muscles attach to the mandible and influence its movement. The masseter, medial pterygoid, and temporalis muscles are responsible for elevating the mandible and enabling jaw closure, while the lateral pterygoid depresses and protracts the mandible to open the mouth. Acting unilaterally, the medial and lateral pterygoid muscles move the jaw to the opposite side, while the masseter muscle facilitates movement of the jaw to the same side.

Symptoms of TMJ dysfunction include ear pain, sore jaw muscles, temple and/or cheek pain, jaw popping or clicking, difficulty opening the mouth fully, and frequent headaches and/or neck aches. The sternocleidomastoid and trapezius muscles also commonly trigger pain throughout the head, face, and jaw. This can perpetuate a secondary reflex arc of the temporalis, masseter, medial pterygoid, and lateral pterygoid muscles. Rule out trigger points from the SCM and trapezius before treating the TMJ musculature.

A therapist and a dentist should work together to address TMJ dysfunction so that the dental and neuromuscular components can be understood and properly treated. TMJ pain and dysfunction could be a result of a range of problems including occlusal disharmony from improper-fitting dentures and crowns, long dental procedures, excessive gum chewing, bruxing (grinding and clenching teeth), direct trauma, anxiety, emotional tension, and chronic improper head and body posture.

When the mouth is opened, the mandibular condyles should translate forward and downward; this simultaneous movement should be fluid and imperceptible. Crackling, clicking, and popping noises may indicate internal derangement of the articulating disk and can lead to muscular tension and pain. Hypertonicity of the lateral pterygoid muscle can actually pull the articulating disk of the TMJ forward, rupturing the posterior retrodisk tissues. Occlusal splint therapy and/or TMJ surgery may be indicated to correct this kind of TMJ dysfunction.

ROUTINE: Temporomandibular Joint

Position of client: supine.

1. Treat the cranial fasciae for approximately 10 minutes. Use a hair-pulling technique utilizing traction and/or thumb compression with friction. Release the layers of fasciae that swirl in and around the ears and TMJ. (See Figures 7.83 and 7.84.)
2. With one hand, rotate the client's head away from the side of treatment. Using flexed fingertips, treat the entire temporalis muscle with circular friction. Friction above and below the zygomatic arch. (See Figure 7.85.)
3. Isolate the temporalis tendon where it inserts on the coronoid process. To do this, have the client open her mouth to expose the temporalis tendon under the zygomatic arch. Treat the muscle and tendon slowly with cross-fiber friction. Use caution—this area can be highly sensitive. Utilize the "minimal" edge technique to ensure the client's comfort (See Figure 7.86.)
4. Using a contoured index finger, treat the mastoid process with slow, deep friction. (See Figure 7.87.)

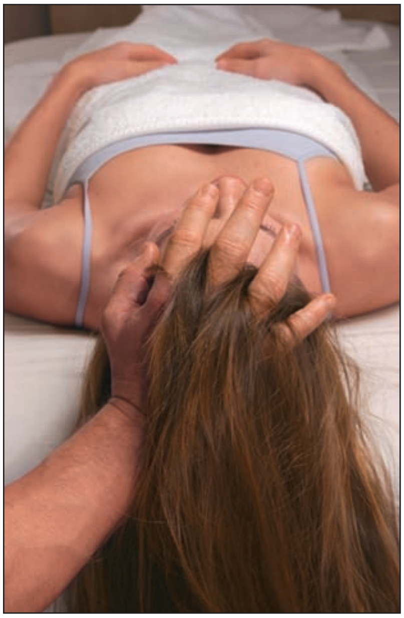


FIGURE 7.83

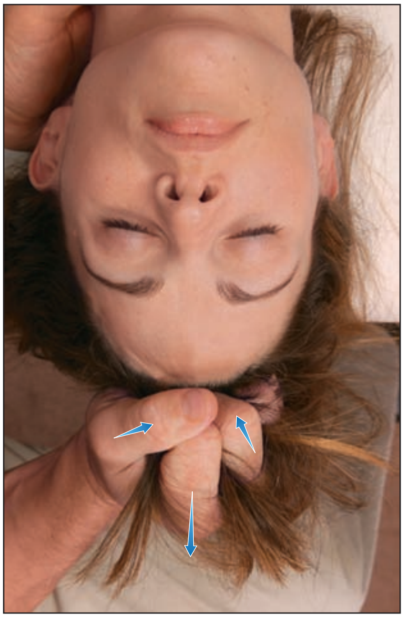


FIGURE 7.84

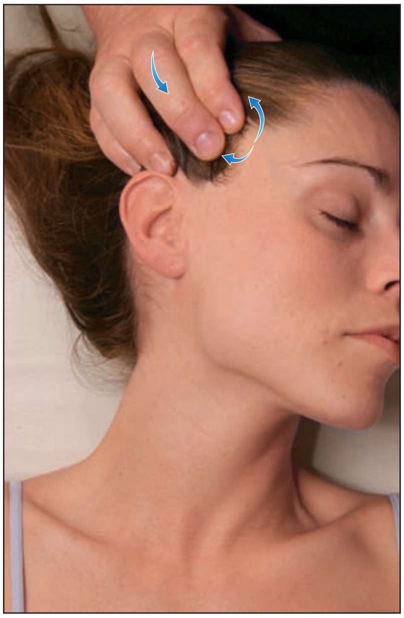


FIGURE 7.85

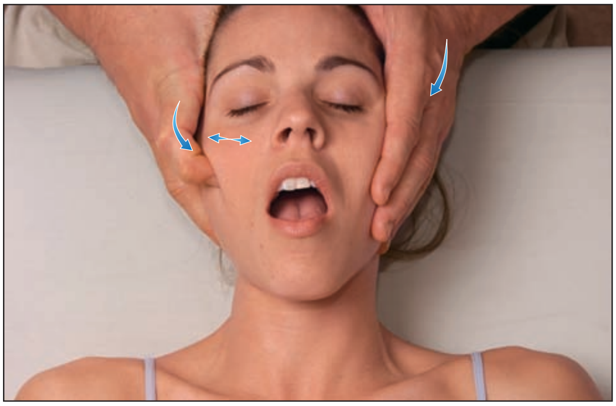


FIGURE 7.86

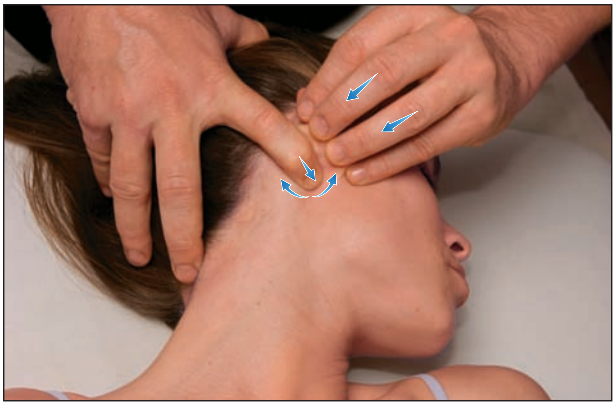


FIGURE 7.87

5. Using the thumb, effleurage the entire masseter muscle from the zygomatic arch to the angle of the mandible.
6. Using the thumb, friction the attachments of the masseter on the zygomatic arch and the angle of the mandible. (See Figure 7.88.)
7. Using the thumb, again effleurage the entire masseter muscle from the zygomatic arch to the angle of the mandible. Insert the index finger into the client's mouth, staying along the inside of the cheek. (See Figure 7.89.)

Note: Before performing intraoral treatments to muscles in the mouth, check your state's regulations to ensure that these treatments are legal within the scope and practice of massage therapy. Wash your hands thoroughly, and always use a glove before administering intraoral treatments.

8. Using the index finger, penetrate laterally and inward until reaching the masseter. To confirm location of the masseter, have the client clench her jaw to contract the muscle and then release. Using the finger and thumb, treat the masseter from the zygomatic arch to the angle of the mandible with compression and friction in ½-inch sections. (See Figure 7.90.)
9. Using the pad of the thumb, apply pressure straight down toward the therapy table. Use the edge technique to penetrate the deep section of the muscle once the superficial section has been released. (See Figure 7.91.)
10. Support the client's head with the nontreating hand for stabilization. To isolate the medial pterygoid, first palpate the hamulus bone. The medial pterygoid will originate just posterior to the hamulus projection, directly behind the upper back molars. Using a flexed index finger, treat the medial pterygoid with compression into the upper fibers of the muscle and hold the pressure until the muscle releases. (See Figure 7.92.) Using a flexed index finger, glide down to the angle of the mandible.
11. Isolate the lateral pterygoid. To do this, have the client deviate the jaw toward the side of treatment so that it is possible to fit the index finger between the cheek and the upper molars, as far back as possible. Using a flexed index finger, treat the lateral pterygoid with the edge technique, using hand signals for communication. Have the client open and close the jaw several times to allow for penetration. Apply light, static compression as far up and toward the TMJ as possible. *No pain means more gain.* (See Figure 7.93.)

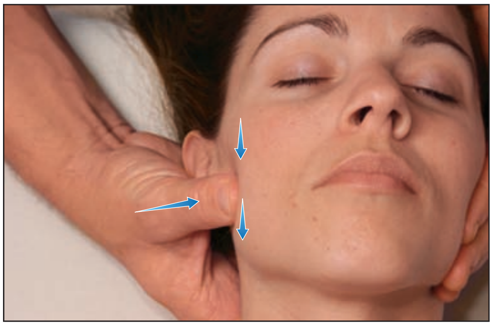


FIGURE 7.88

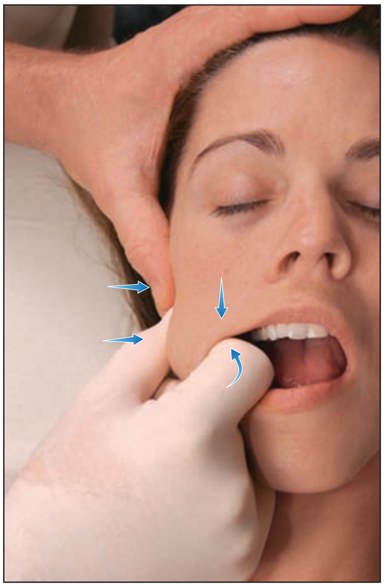


FIGURE 7.89

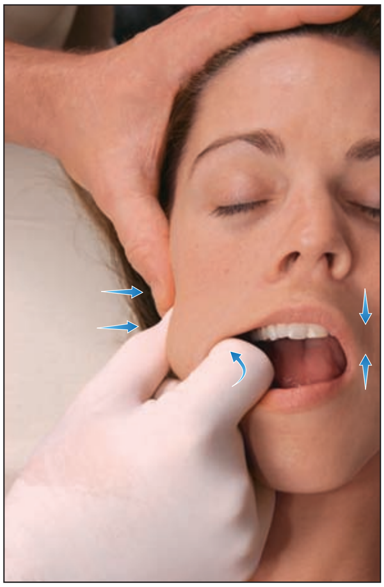


FIGURE 7.90

FIGURE 7.91

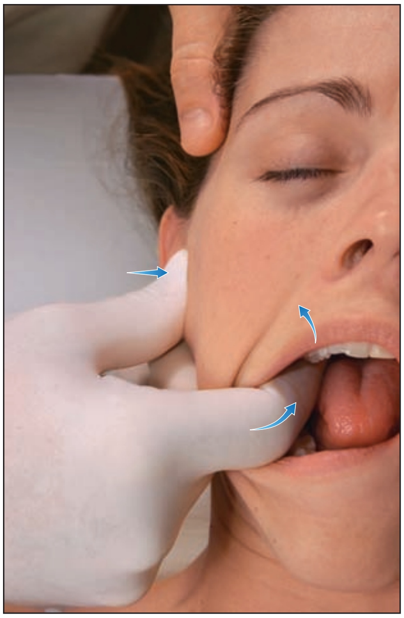


FIGURE 7.92

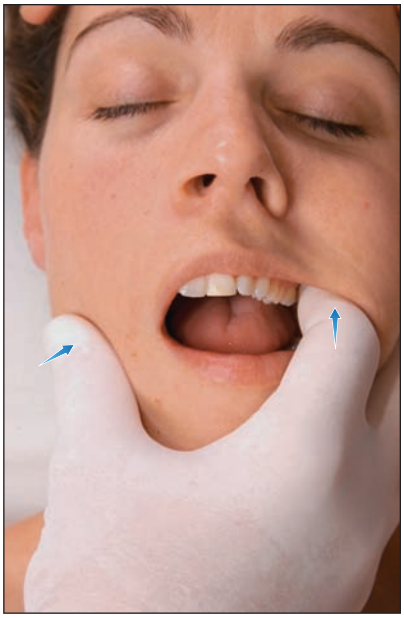


FIGURE 7.93

STRETCHING

Using a body ball, have the client relax and hyperextend the body over the ball, stretching the abdominals, iliopsoas and pectorals as well as the anterior neck muscles. Stretching the anterior torso compartment should be comfortable and relaxing.

FIGURE 7.94 Relaxed anterior torso stretch (over body ball)

Using a body ball, have the client relax and hyperextend the body over the ball, stretching the abdominals, iliopsoas and pectorals as well as the anterior neck muscles. Stretching the anterior torso compartment should be comfortable and relaxing. Now place your hands on the lateral rib cage and assist the client by gently tractioning the rib cage in a superior direction, further assisting the stretching of the hip flexors and abdominals of the ATC.

FIGURE 7.95 Assisted complete anterior torso stretch (over body ball)

Using a body ball, have the client relax and hyperextend the body over the ball, stretching the hip flexors, abdominals, and pectorals as well as the anterior neck muscles.

Stretching the anterior torso compartment should be comfortable and relaxing. Now place your hands on the client's elbows, further assisting the stretching of the pectorals and the anterior neck muscles.

FIGURE 7.96 Assisted anterior torso stretch (over body ball)

Using a body ball, have the client relax and hyperextend the body over the ball, stretching the abdominals, iliopsoas and pectorals as well as the anterior neck muscles. Stretching the anterior torso compartment should be comfortable and relaxing. Now assist the client in lengthening and rotating the trunk. Your lower hand gently stabilizes the ilium on the ASIS (on the side on which you are standing), while your upper hand grasps the client's arm and pushes it across the body, further assisting the rotational stretch of the abdominal muscles of the ATC.

FIGURE 7.97 Assisted anterior torso stretch (over body ball)

With the client in the side-lying position and the leg flexed 90 degrees at the hip, place your upper hand across the posterior pelvis to stabilize the pelvis and place your lower hand on the anterior lower thigh (just above the knee). Hyperextend the client's leg by pulling it back, stretching the hip flexors. Keeping the leg straight will primarily isolate the flexors of the hip, whereas flexing the knee while stretching the hip flexors will also engage the stretch to the quadriceps muscles. These stretches are highly effective and should be performed with a focused intent to ensure the quality of the stretch. Effectiveness and quality are achieved by stretching slowly while communicating with the client to maintain his comfort level. *No pain means more gain.*

FIGURE 7.98 Assisted hip flexor stretch (with rope)

This is the most effective stretch when an assistant is available to help stabilize the client's pelvis; the lower leg is flexed and supported by the assistant's thigh. This allows you to focus strictly on the client's stretch and to maneuver the leg into different positions for isolating and performing a thorough stretch of the hip flexors.

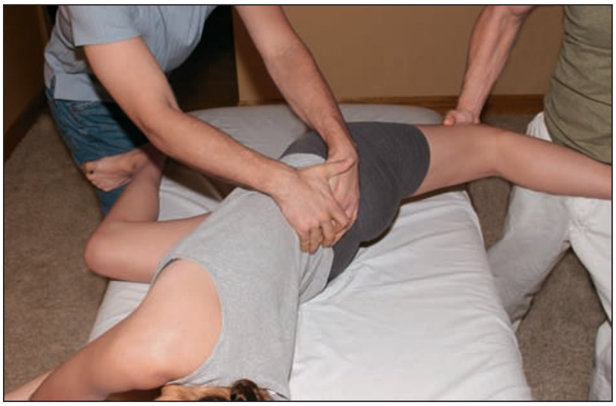


FIGURE 7.99 Two-person assisted hip flexor stretch

Stand behind the client, and stabilize one shoulder while stretching the other. Externally rotate the shoulder, stretching the medial rotators while supporting the client's body.

FIGURE 7.100 Assisted medial rotator stretch

With the client in the standing position, instruct the client to clasp the hands around the back of the neck to support the lower cervical spine. Have the client hyperextend and stretch the anterior cervical muscles.

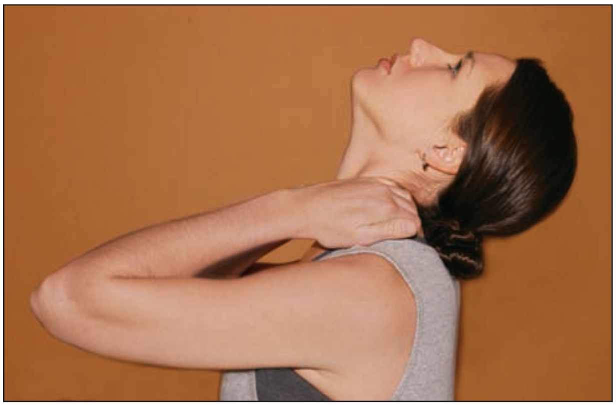


FIGURE 7.101 Anterior cervical stretch

BRIEF SUMMARY

The anterior torso compartment (ATC) is a chain of connecting muscles and fasciae that arise from the pubic bone and iliac crests of the pelvis. It is a pulley system of muscles that attach the front of the pelvis to multiple attachments on the anterior rib cage. Several of the ATC muscles continue upward, making the connection to the shoulder girdles, anterior cervical spine, jaw, and skull. Postural distortions that arise from muscular imbalances of the coronal plane affect many joints, including the sacroiliac, vertebral column, rib cage, shoulder girdle, and jaw. Treatment to the ATC is delivered in sequence, with treatments starting at the abdomen and continuing to the rib cage, chest, shoulder girdle, neck, and jaw.

The Clinical Notes boxes in this chapter cover muscular imbalances that affect posture and pain. The Routine boxes and their illustrations provide guidance for proper hand placement in delivering effective therapy techniques. The Stretching box demonstrates specific stretching techniques that are safe, effective, and easy to do.

REVIEW QUESTIONS

1. Name the primary muscle that compresses the abdominal contents.

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2. What is the main action of the rectus abdominis muscle?

3. The abdominal routine is one of the most important treatments for people suffering from what type of posture?

4. Name the abdominal muscle that rotates the trunk to the opposite side.

5. If a client experiences sustained pain (acute or chronic) of the abdomen, what should the massage/bodywork therapist do?

6. The iliopsoas muscle group comprises what two muscles?

7. List the three divisions of the pectoralis muscle.

8. Acting unilaterally, the sternocleidomastoid (SCM) rotates the head to which side?

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9. Name the two primary flexors of the neck that are located deep within the anterior cervical region and that, when "locked short," can straighten the cervical spine and refer pain to the back of the neck.

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10. List the three primary muscles that close the jaw and clench the teeth.

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CRITICAL-THINKING QUESTIONS

A client complains of occasional tingling and numbness of the fingers and a painful, weak grip.

1. What side-lying routine should the therapist consider treating first, and why?

2. Releasing and lengthening which muscles would help to restore the cervical lordosis?