

# carpal tunnel syndrome: *a proactive, nonsurgical approach*

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#### **COURSE DESCRIPTION**

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Carpal Tunnel Syndrome (CTS) is a common dysfunction massage therapists might see in their practice. It's also one that affects therapists themselves, causing downtime or a complete change of careers. While traditional treatments might bring temporary relief, CTS often turns into a chronic condition. Treating CTS effectively must include a different, concentrated methodology that considers other possible causes of symptoms.

This course offers an alternative, proactive approach to treating CTS using a specific, multifaceted philosophy. It presents contributing factors that can lead to CTS. Most importantly, this course shows massage therapists how to prevent and help heal CTS for their clients.

#### COURSE OBJECTIVE

This course focuses on treatment for CTS that includes creating space or releasing possible impingements in the scalenes triangle of the neck, the thoracic outlet and the carpal tunnel. When you finish this course you will be able to:

- Describe three traditional treatments for CTS and why they fail.
- Explain why creating space or releasing impingements in the three areas of the body discussed is important for working on CTS cases.
- List four symptoms and four causes of CTS.
- Describe the areas of impingement for two syndromes that can contribute to CTS.
- Describe five types of assessments needed when working with clients who have CTS.
- Define Active Isolated Stretching (AIS) and tell why it's important for CTS therapy.
- Describe three wrist and three neck AIS stretches suitable for opening tissues for CTS.
- Describe a wrist and a neck strengthening exercise that can aid in healing CTS.

#### CONTACT HOURS: 2

NOTE: Massage therapists are advised to practice these techniques prior to utilizing them in a clinical setting.

# a daunting history **STATISTICS ON CTS**

Carpal Tunnel Syndrome (CTS) is a problematic condition affecting millions of people in the United States. According to 2002 data from the U.S. Department of Labor Bureau of Labor Statistics, those with repetitive motion injuries, such as CTS, averaged 23 days absence from work. Many workers never return to work because of the continued pain and difficulty performing tasks.

# TRADITIONAL TREATMENTS

Traditional treatments for CTS involve bracing, injected corticosteroids and surgery. For some, these treatments have offered little relief. One published study of surgical and steroidal treatments showed a failure rate of 81.6 percent in total alleviation of symptoms, leaving a curative rate following treatment of 18.4 percent.<sup>1</sup>

While physical therapies can help CTS, if clients don't continue to maintain a routine of exercises to combat it, CTS can return. Another problem with traditional treatments are their focus. As we will discuss later in this course, many times CTS is not in the wrist at all.

## CAUSES OF CTS

While repetitive motion careers such as data entry, factory work and even massage therapy are important factors in developing CTS, other activities such as tennis, golf or even holding a baby can spur its development. More importantly, lifestyle choices can have a big impact on developing CTS.

Factors that contribute to an increased likelihood of CTS include<sup>2</sup>:

- Smoking—In some studies, smoking has been linked to CTS because of possible stagnated circulation to the median nerve.
- Sex—CTS is three times more likely to appear in women than men.
- Poor sleep—Bad sleeping habits are a possible factor in the development of CTS.
- Weight—Being overweight can contribute to CTS.
- Stress—Excessive amounts of stress can cause CTS.
- Posture—Poor posture can contribute to its development.

As an example of how poor posture contributes to CTS, kyphotic, "caved in" shoulders causes wedging to the anterior thoracic spine, and also places pressure on the brachial plexus region. As we will discuss, pressure in these regions, beyond the wrist, can contribute to CTS.

# anatomy of CTS LIMITED SPACE IN THE CARPAL TUNNEL

Anatomically, the carpal region of the wrist is limited in space. Its diameter is not much wider than a finger. Running through the carpal tunnel are nine flexor tendons that act on the hand and the median nerve (Figure 1). Surrounding the tendons is a synovial membrane, which, when inflamed, creates pressure on the median nerve.

Since this limited carpal space must house all the ligaments and muscles, creating space here is a necessary component of therapy. We'll discuss this later in the course.

# SCALENES AND THORACIC OUTLET

The carpal tunnel is not the only

# traditional treatments

- \* BRACING
- \* INJECTED CORTICOSTEROIDS
- \* SURGERY



place that can be limited in space. The thoracic outlet is bordered by the first thoracic vertebra, the superior border of the manubrium sterni anteriorly, and the first rib and costal cartilage laterally.2 The pectoralis major is a large, powerful muscle that, when tight, has a dramatic effect on this region (Figure 2). Tightness of this muscle can "cave in" the anterior spine in a kyphotic posture, causing pressure on the thoracic outlet. In the thoracic outlet, the median nerve and subclavian artery pass between the anterior and middle scalenes in the neck, and can be impinged by these muscles.

# SYMPTOMS OF CARPAL TUNNEL SYNDROME

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According to the Mayo Foundation for Medical Education and Research, symptoms of CTS might include:

- **Tingling or numbness** in your hand or fingers, especially when you're holding a cup, driving a car or reading a newspaper;
- Pain radiating or extending from your wrist up your arm to your shoulder or down into your palm or fingers, particularly after forceful or repetitive use;
- A sense of weakness in your hands and a tendency to drop objects; and
- Chronic loss of feeling in some fingers in advanced cases.

# SYNDROMES THAT CAN CONTRIBUTE TO CTS

While this course focuses on CTS, there are two conditions that must be recognized before therapy can begin. The following conditions are sometimes misdiagnosed as CTS.<sup>3</sup> We will not be discussing how to specifically assess for each of these lifestyle choices can have a big impact on developing CTS.

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Figure 1. the carpal tunnel



Figure 2. the brachial plexus

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syndromes, but understanding their mutual commonality is important.

Table 1 (see below) compares the symptoms of thoracic outlet syndrome and scalenus anticus syndrome to symptoms to of CTS. Since scalenus anticus syndrome is often considered a subcomponent to thoracic outlet, we'll work on these conditions together.

## THORACIC OUTLET SYNDROME

Thoracic outlet syndrome (TOS) is a problematic condition involving the brachial plexus, and more specifically the interscalene triangle. Its impingement sites include:

- from a cervical rib.
- between the anterior and middle scalene muscles.
- between the clavicle and the first rib (costoclavicular syndrome).
- between pectoralis minor and the ribs (pectoralis minor syndrome).

Like scalenus anticus syndrome below, the interscalene triangle must be addressed in therapy. This area, bordered by the sternocleidomastoid and the anterior and posterior scalene muscles, encases nerves and arteries. The soft tissue here can compress the brachial plexus, causing pain and numbness in the arms, hands and neck. The pectoralis maior and minor muscle also must be addressed because of their close relationship to the impingement sites. The median nerve is the focus in the scalenus area so it does involve the thoracic outlet condition. While they are mentioned separately, they are worked on in this modality together.

# SCALENUS ANTICUS SYNDROME (SAS)

Compression of the opening between the anterior and middle scalenes from shortness can imping the brachial plexus and subclavian artery.

# TABLE 1: VERBAL ASSESSMENTS FOR CTS, TOS AND SAS

Condition	Symptom	Possible Causes
Carpal Tunnel Syndrome	Burning, numbness and pain in the wrist, arm, hand and fingers	Limited ROM in wrist/hand musculature, muscle imbalance, poor posture/lifestyle habits, genetically small carpal tunnel
Thoracic Outlet Syndrome	Pain, numbness in arm and fingers (usually 4-5 fingers) Neck pain	Faulty kyphotic posture, limited ROM in pectoralis major and scalenus
Scalenus Anti- cus Syndrome	Numbness, tingling in arms and fingers. Possible vascular symp- toms if subclavian artery is oc- cluded, neck pain	Faulty posture, hyperlordosis of the cervical spine, poor ROM in cervical musculature
SOLIDCE: Timothy Adnew adapted from Otis C. Kinesiology: The Mechanics and Pathomechanics of Human Movement Linnincott William and		

SOURCE: Timothy Agnew, adapted from Otis C. Kinesiology: The Mechanics and Pathomechanics of Human Movement, Lippincott William and Wilkens: Philidelphia, 2004.

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Symptoms include diminished sensation, weakness and tingling in the arms and fingers. The neck may also be painful upon breathing.

# therapy protocols TYPES OF ASSESSMENTS

Specific therapy for CTS delves into many specific stages, all of which cannot be covered in this course. But because the following movements are specific and this modality is physiological (they consist of active, client-involved movements), assessment becomes more than filling out a form. It includes both verbal and physical assessments of the problem, as well as getting a history of any past treatments.

Finally, clients need to understand their role of involvement in therapy. On an ongoing basis, you also need to assess the degree of tightness and pain the client experiences. We will be discussing range of motion (ROM) assessments during the exercises presented later in this course.

#### **EFFECTIVE CTS THERAPY WITH AIS**

While massage can be helpful for CTS cases, sensitive tissues may be too delicate to massage. As a result, the stretching performed with active isolated stretching (AIS)—which was pioneered by Aaron Mattes—can be a more successful method for opening tissues related to CTS.

AIS, a physiologically based method, is the perfect choice for opening shortened tissue when dysfunction exists and sensitivity is high. I use AIS in my Clinical Flexibility and Therapeutic Exercise (CFTE) modality because it's been so effective in my practice. One of the reasons I use AIS in my work is because it reinforces muscle reeducation. Because of the active components, muscles are "awakened" and circulation is increased with each repetition.

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#### VERBAL ASSESSMENTS

With a physiologically based therapy, it's important to first verbally understand clients' complaints. The best way to do this is to let them explain what they are feeling. Do they complain of aches in the arms and neck? Does it bother them at night? Does the pain seem to radiate from the wrist up the arm, or the other way, from the shoulders? Are there car or sport injuries in their past? While this might seem general, knowing these things and comparing them with the symptoms in Table 1 can help formulate your therapy plan.

#### **TREATMENT HISTORIES**

It's is important to find out where the client has received treatment before they came to you. Are they frustrated with past treatment efforts? Since diagnosing is out of your scope of practice, always ask if a previous diagnosis has been made. It's also important to establish a time line since the date of their first symptom.

Some other things to consider are include:

- Is there an existing injury that might impede your therapy? For example, a shoulder injury might make therapy more difficult.
- Is the condition affecting their sleep? If it is, this will make healing more difficult.
- Do they have poor lifestyle habits, such as smoking and/or poor posture?
- Do they have a career that requires repetitive motions?

# types of assessments for CTS

- VERBAL ASSESSMENTS OF THE PROBLEM
- \* HISTORY OF TREATMENT
- RANGE OF MOTION ASSESSMENTS
- \* ASSESSMENT OF TIGHTNESS
- \* PAIN ASSESSMENTS
- \* ASSESSMENT OF DEGREE OF CLIENT INVOLVEMENT



If the client has poor posture habits or is still involved with an overuse activity, the first step is to try and eliminate these as much as possible. Remember, this is a proactive therapy. The client is involved 100 percent of the time. Your job as a therapist is to inspire your clients to want to help heal their dysfunction.

It's common in massage therapy for the client and therapist to be silent during the massage, especially if the massage is relaxing in nature. Of course this has many benefits! In this course, however, you are a teacher, explaining the condition and the therapy. The more you can get your clients involved, the better chance they have of healing.

# physical treatment THE ROLE OF AIS IN THE TREATMENT OF CTS

One of the things to presume in CTS is that the median nerve has been impinged either in the carpal tunnel or as it comes out of the brachial plexus. In my clinical experience, I have never seen a case of CTS where there was not some involvement in the brachial plexus. This is one of the reasons clients still have tingling and pain months after surgery.

The first step, then, is to stretch the tissue and help open the thoracic outlet. It seems appropriate to examine the wrist first for limited ROM, especially if an overuse activity is noted. However, we're going to start our therapy at the neck and shoulders, considering the other two conditions of TOS and SAS along with CTS. Since both SAS and TOS are related to the scalenus muscle group and the pectoralis major and minor, we'll start there.

While massage can be helpful

in easing CTS, sensitive tissue like the scalenes can be too delicate to palpate or apply any direct pressure. For example, if the client has scalenes anticus issues, the anterior scalene will be extremely tender, and pressing into this area can be unbearable. Also, massage will not lengthen the scalenes muscle group the way a gentle stretch can.

If the area is too tender for massage, stretching is another way to open (stretch) tissue. AIS is performed in active movements, with the client providing the movement with the opposite muscle being lengthened. Instead of long holds, stretches are held only one to two seconds, and repetitions of 8 to 10 are performed with several sets. Any passive treatment that requires no physical help from the client is considered not physiological (i.e., you, rather than the client, are doing the moving).

# ASSESSING TIGHTNESS DURING THERAPY

While performing the following stretches, assess your client for tightness. Are there limitations? Since you're stretching areas that are related to respiration, it's important to get your clients to breathe throughout the repetitions-exhaling on the contraction phase (or, while lifting the arm into a stretch), and inhaling on the relaxation (when the client brings the arm or neck back to the start position) phase. This breathing pattern is the same while lifting a weight; exhalation should occur during the lift phase, and inhale during the return phase.

While this course describes assisted movements, every one of these exercises can be performed by the

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*client.* The client should be educated during therapy and instructed how to perform exercises that help keep CTS from returning. After pain and injury are reduced, you should encourage your clients to maintain the condition by continued self-exercises. This course only covers six different assisted exercises, but there are many other components for CTS.

# ASSESSING PAIN LEVELS DURING THERAPY

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Pain is a normal symptom when you are working with an individual who has a chronic condition. It's important to communicate with clients during therapy to assess their pain level. The following exercises are specific and can be intense. This needs to be explained to clients, especially if they are accustomed to relaxing massage therapy.

Remember, pain might be present, and you must adjust the amount of pressure you put into the stretch and help the client work through any discomfort. This is a sensitive thing to learn in bodywork—pressure, especially during stretching, takes practice. But healing cannot take place if clients don't work through some discomfort. This is exactly why physicians now recommend exercise for arthritis; however, the person must persevere through the discomfort of those first few movements.

# creating space in the thoracic outlet PECTORALIS MAJOR

To start creating space in the thoracic outlet, begin with the pectoralis major. Start by standing behind your client. Ask the client to flex her arms out in front, palms facing each other (Figure 3a). Your hands



Figure 3a. opening brachial plexis, start position

Figure 3b. opening brachial plexis, end position



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can be placed under the arm, between the crease of the elbow and wrist. She then contracts the trapezius, posterior deltoid, rhomboids and latissimus to bring the arms back into horizontal abduction as far as she can.

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You should instruct her to "squeeze" the shoulder blades together by contracting the rhomboids, and she should not let the palms rotate down as she comes back. You guide her and apply a gentle one- to two-second stretch at the end movement (Figure 3b). This is repeated 8 to 10 times, slowly lengthening the pectoralis major. The client should

return to the start position each time, creating a full range of motion for the stretch.

She also should be instructed to contract her abdominal muscles during the stretch to prevent hyperextension of the back. This movement is also known as horizontal abduction, and the shoulder joint is capable of moving an average of 90 degrees from the flexed beginning start of this stretch.

# **PECTORALIS MINOR**

Pectoralis minor is another postural muscle that, along with pectoralis major, can pull the shoulders for-



Figure 4b. opening brachial plexus (petoralis minor), finish position

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start position



ward into a kyphotic posture and impinge the brachial plexus. Like pectoralis major, its distinct relationship with the thorax (i.e., its attachment to ribs three through five) impinges it. Poor posture also can affect proper breathing as well as create anterior wedging of the cervical disks.

For this stretch, stand behind your client and ask her to raise the arms up in front, higher than the previous stretch (Figure 4a). The client reaches back by contracting the same posterior muscles as in the previous stretch, and a gentle stretch is applied at the end movement (Figure 4b).

Be sure to remind the client to contract the abdominal muscles during the movement. You can place your hip into the client's lower back to help prevent hyperextension of the low back.

#### INTERSCALENE TRIANGLE

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The importance of the anterior, middle and posterior scalenes was discussed earlier. Before beginning these exercises, ask the client to move her neck in flexion, rotation and lateral flexion. Are there limitations or pain? Normal ROM for the cervical region is flexion (45 degrees), lateral flexion (45 degrees) and rotation (170 degrees).

These next AIS stretches are very important, and very precise. If the right angle is not obtained, the scalenes cannot be stretched effectively. These muscles—especially the anterior scalene—can be extremely tender, so be very gentle.

Position yourself on one side of the client's body so that you are *pulling* during the stretch toward you (Figure 5a). The pulling mo-



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Figure 5a. interscalene triangle, start position



Figure 5b. interscalene triangle, finish position

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Figure 6a. posterior scalenus, start position

Figure 6b. posterior scalenus, finish position

tion is much safer and you will have more control of pressure. The client rotates the head away from you 45 degrees (Figure 5b). Place one hand on the shoulder, with your fingers gently pressing on the anterior scalene. Your fingers will remain here to feel for the pliable change after a few sets have been performed. You can easily find it after the head is rotated; this muscle lies just posterior to the sternocleidomastoid, and is partially tucked underneath it when the head is in the neutral position.

Your other hand should be over the top of her head. Instruct the client to move the head posteriorly, ear to shoulder blade. Apply a gentle stretch at the end movement, keeping your fingers over the anterior scalene. Since you are stretching an area that encases arteries and nerves, be sure to remind the client to breathe and to keep her eyes open during these neck stretches to prevent dizziness. Also, be sure that you are not applying pressure with your fingers directly on the neurovascular bundle that runs between the anterior and middle scalenes.

After several sets, the scalenes should feel softer and be less painful. If the client experiences pain during the movement, start in small increments, but continue to achieve the fullest ROM possible. In my clinical experience, pain is alleviated after five or six repetitions, when blood flow is restored to the area.

#### POSTERIOR AND MIDDLE SCALENES

This stretch works on the middle and posterior scalenes, as well as the upper trapezius, levator scapulae, semispinalis capitis, longissimus capitis and erector spinae. The head is rotated in the same 45 degree angle. This time the client brings the head *forward*, ear to the top of the breast (Figures 6a, 6b). Remember, you should be positioned on the side of the client where you can *pull* during this stretch. Apply a gentle stretch.

# THORACIC EXTENSION

To help poor posture, and to help ereate more space in the thorax, it's necessary to open the anterior thoracic spine. This is a dynamic movement that helps Dowager's hump (wedging of the cervical disks) and helps expand the often eramped chest cavity that holds the diaphragm. To perform this exercise, you need an isolation belt (see opposite page) and a pad.

Have the client lie on the table prone, and place a bolster under the ankles. You don't have to use a face cradle for this exercise; the client rests her chin on the table.

If the client has a history of low back issues, a second isolation belt may be used at the ankles as shown in Figure 7a. This keeps the legs from lifting with the thorax, preventing wedging to the lower lumbar disks. Palpate the 12th rib and slowly count up to the 9th rib. Place the pad and belt across this region, making certain the belt is tight.

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Figure 7a. thoracic extension (with two isolation belts)



Figure 7b. opening anterior thoracic spine, start



Figure 7c. opening anterior thoracic spine, finish



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Figure 8a. carpal tunnel stretch (anterior), start position



Figure 8b. carpal tunnel stretch (anterior), finish position

If you have a colleague available, he or she can assist with this stretch by standing on the opposite side of the table. Each therapist places his or her hands over the shoulder, just superior to the acromion.

Next ask the client to squeeze her scapulae together and lift her shoulders back, and then lift the chest off the table. As she gets to the end movement, the therapists gently apply a stretch by pulling back *together* on the shoulders (Figures 7b, 7c).

It is important that the client inhales deeply, then forcibly exhales during the up phase. Be sure to communicate with the client after each repetition, and make certain the low back is not affected. This movement can be done with herniated disk issues, but carefully assess with past histories and constantly communicate for pain.

# creating space in the carpal tunnel NORMAL ROM FOR THE WRIST

Now that we have opened tissue in the thorax and released some of the tissue that might be impinging the median nerve, we will examine the wrist. We will be performing three different stretches. Normal ROM for the wrist is 90 degrees (flexion); 0 degrees (extension); 90 degrees (hyperextension); 45 degrees (ulnar flexion) and 25 degrees (radial flexion).

# STRETCHING THE WRIST FLEXORS

This stretch affects the client's palmaris longus, flexor carpi ulnaris and radialis, flexor digitorum superficialis and profundus, and flexor pollicis longus.

You and your client are seated. The client flexes the arm palm up and is instructed to keep the elbow



locked throughout the exercise. You place one hand just below the elbow and the other clasps her fingers (Figure 8a). The client extends her hand down and a gentle stretch is applied at the end movement (Figure 8b).

Extending the wrist often produces discomfort for a client with a narrowed carpal tunnel, but this does not mean this extension movement shouldn't be done. It is important to hold the wrist in the extended position for only the two-second period. Then the wrist should be returned fully into flexion.

This continued full range of motion pumps blood into the carpal tunnel, and many times the client will report that her symptoms have improved after one set of this stretch. If the client has a limited ROM, or the pain is too intense, adjust the pressure and only extend the wrist in small intervals each set.

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Again, communicate about pain levels. The wrist will likely be sensitive to this stretch, but it's important to work through mild discomfort. If the client is unable to perform this stretch, try cryotherapy (ice massage) first, and then try it again. Discomfort is usually reduced after a set or two, when circulation has been improved. In my clinical experience, I've always been able to gently introduce these stretches.

This stretch affects extensor carpi radialis longus, extensor pollicis brevis, extensor digiti minimi, extensor digitorum, extensor carpi ulnaris, and the retinaculum.

# STRETCHING THE WRIST EXTENDERS

This exercise uses the same positions as the previous stretch, except this time the client turns the palms



Figure 9a. carpal tunnel posterior, start position

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Figure 9b. carpal tunnel posterior, finish position

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Figure 10a. carpal tunnel variation (client must have a tight fist), start position



FIGURE 10b. carpal tunnel variation, finish position

down with the wrist flexed. You and the client are seated. Have your client flex her arm, palm down, and instruct her to keep her elbow locked throughout the exercise.

Next, place one hand just below her elbow, and the other clasps her fingers. The client flexes the wrist so her hand moves down and a gentle stretch is applied at the end movement (Figure 10a).

#### WRIST EXTENDERS: FIST VARIATION

This is a variation of the previous

stretch, and I like to include it because it's a powerful stretch for the carpal tunnel. Be very gentle with this movement. Again, work with the limitations of the client. The best approach is to do it in small increments in wrist flexion that are slowly increased as blood circulates.

The client makes a tight fist with the thumb tucked inside, and the arm remains locked and flexed in front (Figure 10a). After flexing the fist down, you apply a gentle twosecond stretch at the end movement (Figure 10b).

# strengthening STRENGTHENING THE WRIST AND FOREARM

Now that you've opened tissue and created space for the median nerve, it's necessary to strengthen the muscles of the wrist and neck. Imbalances in muscle groups can help cause chronic dysfunctions and, if left untreated, can slow healing.

#### WRIST ROLLER

This strengthening exercise affects the palmaris longus, flexor carpi ulnaris and radialis, flexor digitorum superficialis and profundus and flexor pollicis longus; extensor carpi radialis longus, extensor pollicis brevis, extensor digiti minimi, extensor digitorum and extensor ulnaris

One of the most powerful ways to strengthen the forearms without performing 10 different exercises is to use a wrist roller (Figure 11a). This is a 14-inch long, 2-inch in diameter PVC pipe with a hole drilled into the center, and it can be put together at any hardware store. Five feet of quarter-inch rope holds a weight, and this is "rolled" up and down to strengthen the wrists dynamically.

You should encourage your client

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to have one of these, as these exercises are simple to perform. Begin with a light weight of two or three pounds, then add more as the client gets stronger.

Have the client stand straight and flex her arms out in front of her, palms face down (Figure 11b). Grasping the tube with the weight on the floor, she begins to roll the rope around the tube clockwise, pulling the weight up. This strengthens the *flexors* of the forearms. She can drop her arms and relax before rolling the weight back down to the floor in the same controlled manner (counterclockwise). The down movement is an eccentric (lengthening) muscle contraction, so be sure she lets the weight down slowly to challenge the muscles.

Now, in the same starting position, she rolls the tube *counterclockwise*, pulling the weight all the way to the tube. She **slowly** returns it to the floor. This counterclockwise movement strengthens the *extensors* of the forearm. Perform 2 to 3 sets of 10 in both directions.

#### NECK STRENGTHENING

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This stretch affects the scalene, sternocleidomastoid, erector spinae and prevertebral muscles.

While there is not enough room in this course to include all the strengthening exercises for the neck, strengthening is an important component for working with brachial plexus impingements. The neck can be strengthened very simply, without weights or machines. For starters, try this simple exercise to strengthen the flexors of the neck.

Have the client lie on her side on a therapy table, letting her head gently hang off the edge. You must support the head at all times (Figure 12a). Instruct the client to keep her shoulders relaxed, and lift the ear to the shoulder, moving the head toward the ceiling. At the end of the movement, apply a gentle stretch (Figure 12b).

This exercise should be done with support at all times during therapy! If a client has difficulty with the movements, you can assist during them; however, make certain that the client is helping. If the client does these on her own, she can simply have her head on the bed or floor; she should just not let her head hang over an edge. I've never had a client who could not perform these movements by him- or herself. Try two to three sets of 10. However, if the client is extremely weak, lessen the repetitions.

#### SUMMARY

CTS can become a chronic, difficult-to-treat condition, and it's often misdiagnosed in the health care community. It's also syndrome that traditional treatments often fail to help. This course discussed the relationship between thoracic outlet syndrome, scalenus anticus syndrome and carpal tunnel syndrome. They often present with common symptoms and, therefore, should all be considered when working with clients who have CTS. Creating space for the median nerve, both in the thoracic outlet and carpal tunnel, is vital.

AIS exercises used in this course can dynamically help open tissue, and stretching is one of the most recommended forms of therapy for all three syndromes discussed in this course. AIS is also one of the safest methods because its exercises



**Figure 11a.** strengthing the wrist and forearm with a wrist roller, start position. NOTE: twist the cylinder clockwise.



**Figure 11b.** strengthing the wrist and forearm with a wrist roller, finish position. NOTE: twist the cylinder counterclockwise.

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Figure 12a. neck flexor strengthening, start position



Figure 12b. neck flexor strengthening, finish position

mimic everyday movements; it uses rotation, extension, flexion, etc., and keeps the movement active with contraction of agonist muscle tissue.

In review, to effectively help treat CTS under this philosophy, it is necessary to:

- correct any negative postures or habits that contribute to CTS.
- create space in the thoracic outlet and carpal tunnel by active stretching of tissues.
- strengthen in order to balance muscle groups.
- educate the client.
- design a proactive routine for client to treat the condition.

While this course discussed assisted therapy, ultimately, clients should be educated about their condition and taught how to work on it at home, as all the exercises in this course can be performed by the client.

Carpal tunnel, like many chronic conditions, is not a condition that can be worked on for six weeks and then abandoned. Like many overuse injuries, CTS therapy must be maintained throughout a lifetime.

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