

## CERVICAL DORSAL OUTLET (CDO) SYNDROME

The anterior scalenus muscle is attached to the first rib in front of the middle and inferior trunks of the brachial plexus and the subclavian artery. Should the anterior scalenus muscle become shortened and begin compressing the nerve trunks and artery caught between it and the rib, a brachial neuritis may occur. Paresthesia of the portion of the arm and forearm supplied by the ulnar nerve is sometimes present and often accompanied by radiating pain throughout the nerve distribution. Pallor, abnormal coolness and cyanosis may appear in the fingers of the involved hand. In very advanced cases, the mechanical pressure on the artery may cause thrombosis and artery closure with resultant gangrene (which generally begins with the finger tips). Weaknesses and atrophy of the intrinsic muscles of the hand and finally the muscles of the entire upper extremity may occur, occasionally leading in extreme cases to a *claw-hand* deformity. This syndrome is called the *Cervical Dorsal Outlet (CDO) or (commonly) Thoracic Outlet Syndrome*.

The *CDO Syndrome* may be confirmed by a diminution of the radial pulse when the involved arm is elevated above the head (causing scapular adduction and depression) while the patient rotates the head toward the involved extremity and looks up at the involved hand. In advanced cases complete cessation of palpable radial pulse will occur.

A congenital anomaly known as a *cervical rib* may occur, which was *formerly* thought to be the major source of the *CDO Syndrome*. The cervical rib is a supernumerary bony growth attached most often to the seventh cervical vertebra, but it may be alternately attached to the sixth. Cervical ribs usually occur bilaterally, with one cervical rib being positioned higher on the spine than that on the contralateral side. In addition, one is usually more highly developed than the other. Such extra ribs become a problem when the lower components of the brachial plexus are in close approximation with them, especially if the middle trunk of the seventh cervical nerve crosses over the transverse process of the seventh cervical vertebra, and the inferior trunk crosses over either the cervical rib or the fibrous band connecting it with the first rib. Additionally, the mechanical factors of posture may cause the middle and lower portions of the brachial plexus to be stretched over the cervical rib, or the anterior scalenus muscle may act to compress those segments of the nerve against the cervical rib and the subclavian artery, which normally lies in front of the rib and behind the anterior scalenus muscle. When compounded by the friction that may occur between the nerves, the subclavian artery, and the cervical rib when the shoulder and arm are used the symptomology associated with the *CDO Syndrome* may be produced.

However, the *CDO Syndrome* is more commonly associated with occupations in which the patient habitually keeps one or both arms supported with the shoulder girdle in a raised position. This posture may cause the anterior scalenus muscle(s) to tonically shorten. If it shortens enough, it will precipitate a *CDO Syndrome* when the shoulder girdle is allowed to drop and scapular pressure comes to bear on the nerve and/or subclavian artery. Potential victims of this disorder generally include teachers, students, truck drivers, and accountants.

It is not unusual for a zone of relatively high skin resistance (as determined by Differential Skin Survey) to appear over the lateral base of the neck when other symptoms of a *CDO Syndrome* are present. This zone of high skin resistance is generally found within an area bordered by the clavicle anteriorly, the upper trapezius muscle posteriorly, and the sternocleidomastoideus muscle medially, and over the bellies of the scaleni muscles.

### Treatment

Traditional treatment of the *CDO Syndrome* centered on relengthening the scaleni muscles, to reduce mechanical pressure on the middle and inferior brachial plexus and subclavian artery trapped between the anterior scalenus and the first rib. An exercise program, called *Hale's Regime*, was utilized to cause prolonged and repeated stretch of the scaleni muscles. In general it was eventually effective, if the patient kept up the regime for two full weeks, but the immediate effect of the stretching was to immediately increase the discomfort experienced by the patient (a pulled muscle pulls back and a *tight* muscle pulls back even harder). A more effective, more comfortable and quicker program has been developed, utilizing electrical stimulation, manipulation, and mechanical vibration.



### **The high skin resistance pattern associated with the CDO Syndrome**

#### **Application:**

- Manipulate the tissues over and around the scaleni area to eliminate any adhesions that might be present.
- Preset the ultrasound unit to deliver a 1 MHz pulsed waveform, at 1.5 W/cm<sup>2</sup>. Ultrasound the inflamed zone utilizing an effective non-steroidal anti-inflammatory as a coupling agent, for six minutes.
- Semi recline the patient. Turn the patient's head toward the opposing, uninvolved, side. Abduct and fully support the involved shoulder at 90°. Have the elbow fully extended. Place a negative electrode over the involved scaleni, and the positive electrode over the upper or lower trapezius muscle. Preset the electrical stimulator to deliver a 7 Hz, wide-pulsed galvanic current for 10 minutes. Adjust the stimulator amplitude to produce visible rhythmic contractions. If the negative electrode is well placed, most all of the musculature in the upper extremity will visually respond to the stimulation.
- Following the electrical stimulation, mechanically vibrate the subclavian and pectoralis minor areas on the involved side for one minute, while the patient remains (without moving) in the position described above. The anterior serratus muscle on the involved side should likewise be stimulated for one minute. Have the patient remain in the treatment position for five minutes following cessation of the vibration.

This treatment lengthens the scaleni muscles by essentially readjusting the secondary stretch reflex, thereby avoiding the temporary increase in the patient's level of pain produced by stretching. Generally, the *CDO Syndrome* is relieved in a single session, but the patient must refrain from habitually supporting the shoulder girdle, allowing the scaleni to shorten. The patient should be encouraged to return for reevaluation within the next few days.

**Post Treatment Suggestions:**

The patient should be encouraged to engage in exercises that strengthen the upper back muscles, especially the scapular adductors. These may include bench presses, push ups, chin ups, “dips” on parallel bars, weight rowing, and pull-downs.

**Trigger Points**

The following trigger point formations may, singly or in combination, imitate or contribute to the pain associated with the *CDO Syndrome*: Posterior cervical group, Levator scapulae, Scalenus, Scalenus minimus, Infraspinatus, Medial teres major, Lateral teres major, Teres minor, Coracobrachialis, Lower splenius cervicis, Upper trapezius, Middle trapezius [A], Middle trapezius [B], Middle trapezius [C], Lower trapezius [A], Cervical multifidus (C4-C5), Supraspinatus (muscle), Supraspinatus (tendon), Latissimus dorsi (upper portion), Serratus posterior superior, Serratus anterior, Subclavius, Subscapularis, Posterior deltoid, Anterior deltoid, Pectoralis major (costal), Pectoralis major, Pectoralis major (sternal), Pectoralis minor, Sternalis, Rhomboids, Medial triceps (deep fibers), Medial triceps (lateral fibers), Lateral triceps, Triceps (long head), Distal medial triceps, Anconeus, Biceps brachii, Brachialis, Supinator, Extensor carpi radialis brevis, Extensor carpi ulnaris, Middle finger extensor, Ring finger extensor, Palmaris longus, Flexor carpi radialis, Flexor carpi ulnaris, Brachioradialis, Pronator teres, Extensor indicis, Flexor digitorum sublimis (radial head), Flexor digitorum sublimis (humeral head), Flexor pollicis longus, Abductor digiti minimi, Second dorsal interosseus, Opponens pollicis, Adductor pollicis, First dorsal interosseus, and Extensor carpi radialis longus.