freedom from thoracic outlet syndrome

The name thoracic outlet syndrome (TOS) refers to three different conditions: anterior scalene syndrome, costoclavicular syndrome and pectoralis minor syndrome. The reason that these three conditions are all grouped together as TOS is that they are all entrapment syndromes of the brachial plexus of nerves and/or the subclavian artery/vein in the region where the thorax "outlets" into the upper extremity (Figure 1). As a result, all three types of TOS can result in nerve or vascular impingement, resulting in symptoms in the upper extremity.

Types of TOS

With all three types of TOS, the name describes the location of the impingement. In anterior scalene syndrome, the brachial plexus and subclavian artery run between the anterior and middle scalene muscles in the anterolateral neck. If the scalene muscles are tight, perhaps due to a whiplash accident, impingement may occur. In costoclavicular syndrome ("cost" means rib), the brachial plexus and subclavian artery and vein run between the first rib and clavicle in the medial pectoral region. If the posture of the relationship of the clavicle and first rib changes and they approximate each other—as often happens with rounded and slumped shoulders—impingement may occur. In pectoralis minor syndrome, the brachialis plexus and subclavian artery and vein run between the pectoralis minor muscle and the rib cage in the lateral pectoral region. Impingement can also occur if the pectoralis minor is tight; this often happens with slumped shoulder postures as well.

The Brachial Plexus

The brachial plexus of nerves is created by a mixing of the C5, C6, C7, C8 and T1 spinal nerve roots. As a

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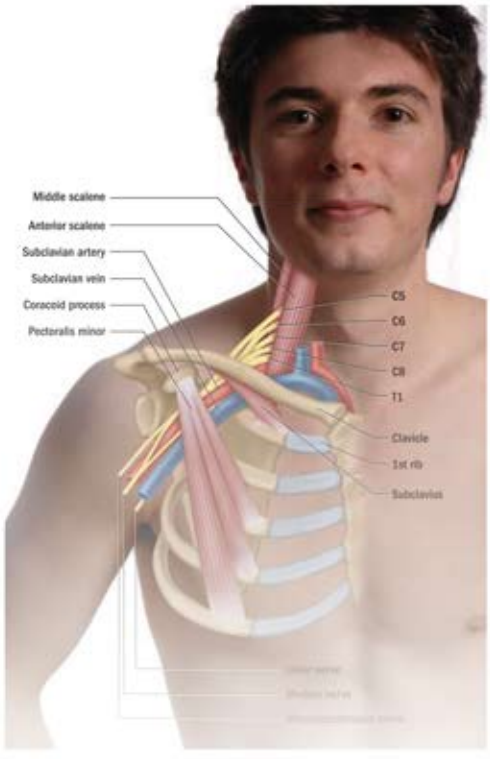
For more information about TOS go to **www.nlm.nih.gov/medlineplus/thoracicoutletsyndrome.html.**

result of this intermixing, the brachial plexus creates five major nerves: the median, radial, ulnar, musculocutaneous and axillary (Figure 2). These nerves carry both sensory innervation and motor innervation that supply the upper extremity. Sensory information travels upward from the upper extremity through sensory neurons of the brachial plexus nerves and enters the central nervous system (CNS) to alert us to the sensations that we feel in the upper extremity. Motor information travels downward from the CNS through motor neurons of the brachial plexus nerves and enters the upper extremity to direct its musculature to contract as needed. Therefore, TOS can cause sensory and/or motor symptoms in the upper extremity depending upon which aspect of a brachial plexus nerve is impinged. Typical sensory impingement symptoms include pain (sharp or dull), numbness and tingling; the typical motor impingement symptom is weakness of the affected musculature. Further, because the brachial plexus innervates the entire upper extremity (arm, forearm and hand), these symptoms can occur anywhere within the upper extremity.



ARTWORK BY FRANK FORNEY

Subclavian Artery and Vein

The subclavian artery feeds oxygenated blood to all tissues of the upper extremity; the subclavian vein drains deoxygenated blood from all tissues of the upper extremity

usually manifests in color changes such as blanching (a pale or whitish appearance) or cyanosis (bluish/purplish appearance) of the skin. Both of these result from a loss of blood supply to the tissues. Even though TOS brachial plexus nerve impingement is more common and usually more serious than TOS vascular impingement, subclavian artery impingement is particularly important because therapists use impingement of the subclavian artery to assess TOS.

Importance of TOS Assessment

Because symptoms of TOS can be located anywhere within the upper extremity, TOS may be misdiagnosed in clients by physicians and other qualified health care professionals. Mistakenly, clients are often told that they have a pathologic condition of a cervical disc or carpal tunnel syndrome because these conditions also cause nerve impingement with sensory/motor symptoms in the upper extremity. Given the possibly serious recourse to surgery for these other conditions, accurate assessment of TOS in our clients is of paramount importance. Another important reason to accurately assess TOS in our clients is that all three types of TOS respond so well to massage and bodywork.

Method of TOS Assessment

With all three types of TOS, you