Newsletter

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Thoracic Outlet Syndrome

Nichlolas Institute of Sports Medicine and Athletic Trauma

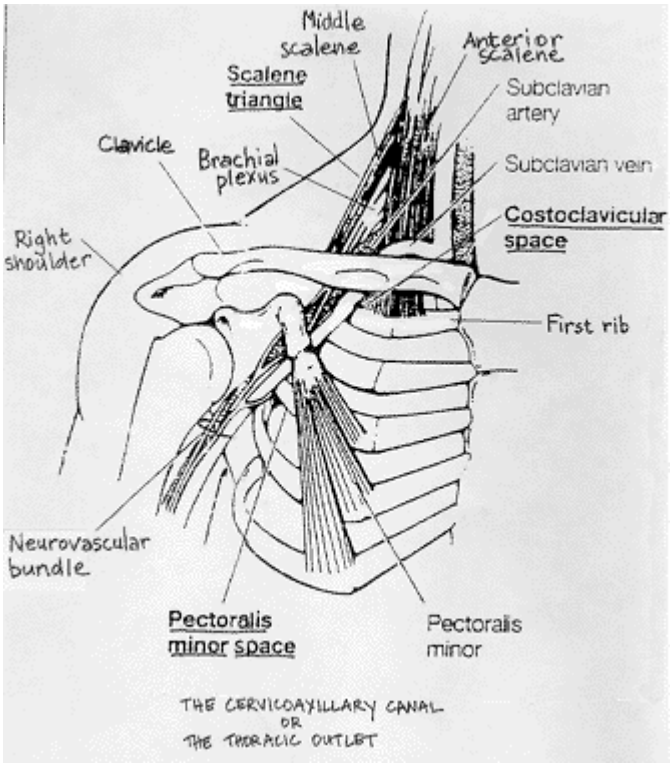
More than just a pain in the neck. Thoracic outlet syndrome is actually a collection of syndromes brought about by abnormal compression of the neurovascular bundle by bony, ligamentous or muscular obstacles between the cervical spine and the lower border of the axilla.

What does that mean?

First of all a syndrome is defined as a group of signs and symptoms that collectively characterize or indicate a particular disease or abnormal condition.

- The **neurovascular bundle** which can suffer compression consists of the brachial plexus plus the C8 and T1 nerve roots and the subclavian artery and vein.
- The **brachial plexus** is the network of motor and sensory nerves which innervate the arm, the hand, and the region of the shoulder girdle.
- The vascular component of the bundle, the **subclavian artery and vein** transport blood to and from the arm, the hand, the shoulder girdle and the regions of the neck and head.

The bony, ligamentous, and muscular obstacles all define the cervicoaxillary canal or the thoracic outlet and its course from the base of the neck to the axilla or arm pit. Look at the scheme of this region and it all becomes more easily understood.



What are the signs and symptoms of thoracic outlet syndrome?

It is important to understand that presenting with the symptoms listed below in no way indicates a definitive diagnosis for thoracic outlet syndrome. Professionals understand the importance of coupling diagnostic testing skills with the patient's report of what hurts and what doesn't seem to be working properly. *Don't self diagnose!* Neurologic and vascular symptoms can be indicative of more serious conditions.

Vascular symptoms include:

- Swelling or puffiness in the arm or hand
- Bluish discoloration of the hand
- Feeling of heaviness in the arm or hand
- Pulsating lump above the clavicle
- Deep, boring toothache-like pain in the neck and shoulder region which seems to increase at night
- Easily fatigued arms and hands
- Superficial vein distention in the hand

Neurologic symptoms include:

- Parasthesia along the inside forearm and the palm (C8, T1 dermatome)
- Muscle weakness and atrophy of the gripping muscles (long finger flexors) and small muscles of the hand (thenar and intrinsics)
- Difficulty with fine motor tasks of the hand
- Cramps of the muscles on the inner forearm (long finger flexors)
- Pain in the arm and hand
- Tingling and numbness in the neck, shoulder region, arm and hand

What causes the neurovascular compression?

Compression occurs when the size and shape of the thoracic outlet is altered. The outlet can be altered by exercise, trauma, pregnancy, a congenital anomaly, an exostosis, postural weakness or changes.

Below is a list of the component syndromes which comprise thoracic outlet syndrome along with a brief description of each. Refer to the scheme for questions about the gross anatomy of the region.

Anterior scalene tightness
Compression of the interscalene space between the anterior and middle scalene muscles-probably from nerve root irritation, spondylosis or facet joint inflammation leading to muscle spasm.

Costoclavicular approximation
Compression in the space between the clavicle, the first rib and the muscular and ligamentous structures in the area-probably from postural deficiencies or carrying heavy objects.

Pectoralis minor tightness
Compression beneath the tendon of the pectoralis minor under the coracoid process-may result from repetitive movements of the arms above the head (shoulder elevation and hyperabduction).

What sort of activities can cause these compression syndromes?

Thoracic outlet syndrome has been described as occurring in a diverse population. It is most often the result of poor or strenuous posture but can also result from trauma or constant muscle tension in the shoulder girdle.

Static postures such as those sustained by assembly line workers, cash register operators, students of, for example, those who do needle work often result in a drooping shoulder and forward head posture. This position of the shoulders and head is also indicative of poor upper body posture. Middle aged and elderly women who suffer from osteoporosis often display this type of posture as a result of increased thoracic spinal kyphosis.

Carrying heavy loads, briefcases and shoulder bags can also lead to neurovascular compression. Humans are not well adapted as beasts of burden and heavy loads hung form the shoulders and arms can stress the supporting structures of the shoulder girdle which is basically suspended by the clavicle and all of the component ligaments and muscles.

Occupations which require repetitive over head arm movements can also produce symptoms of compression . Electricians, painters and plasterers may develop hyperabduction syndrome. Compression of the neurovascular structures also occurs in athletes who repetitively hyperabduct their arms. Swimmers, volleyball players, tennis players and baseball pitchers may suffer compression of the neurovascular structures as well. However, compression of these structures may be caused by stretching or microtrauma (small tears in muscle tissue) to the muscles which support the scapula.

Are there other causes of thoracic outlet syndrome?

Some people are born with an extra rib right above the first rib. Since this intersection of nerves, vessels, muscles, bones and ligaments is already quite involved one can imagine what the presence of an extra rib in the region might do. A fibrous band extends from this cervical rib to the first rib causing an extra bend in the lower part of the brachial plexus which may produce a compression in this region.

How is thoracic outlet syndrome treated?

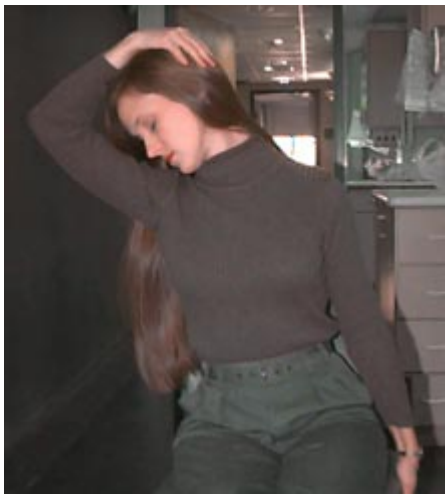
The first step to beginning any treatment begins with a trip to the doctor. Make a list of all of the symptoms which seem to be present even if the sensations are vague. Make a note of what activities and positions produce or alleviate the symptoms and the time of day when symptoms are worst. Also, note when the symptoms first appeared. This list is important and should also include any questions one may have.

Due to overlapping in terms of symptoms it is difficult to make a definitive diagnosis; this is why a list is so important. Certain diagnostic tests have been designed which are very useful for examination. These tests involve maneuvers of the arms and head and can help the practitioner by providing information as to the cause of the symptoms and help in designing an approach to treatment. These tests, accompanied by a thorough history help in ruling out other causes which may produce similar symptoms. These include Pancoast tumor, neurofibromas, cervical spondylosis, cervical disk herniation, carpal tunnel syndrome and cubital tunnel syndrome. Don't forget to ask your practitioner about these conditions as well.

Once a diagnosis is decided, every effort is made for a conservative treatment approach. That means it won't hurt. Should symptoms persist over 3 or 4 months or if there is intractable pain, vascular loss or neuralgic loss then surgery should be considered. Surgery is consistent in relieving pain but muscle weakness and atrophy do not usually improve significantly.

Conservative treatment usually includes local heat and a program which address postural retraining, shoulder strengthening and stretching exercises. The practitioner will create a treatment program specific to the presenting symptoms. Below are a few self-stretching exercises. All of these exercises should be performed slowly and carefully. Each position is assumed smoothly to the point where a stretch is felt intensely but with no pain. There should be no bouncing in any of these positions. Hold the stretch for 30 seconds and then gently and slowly release it. Wait 10 seconds and repeat the stretch 3-5 times. If the stretches increase the symptoms do not continue.

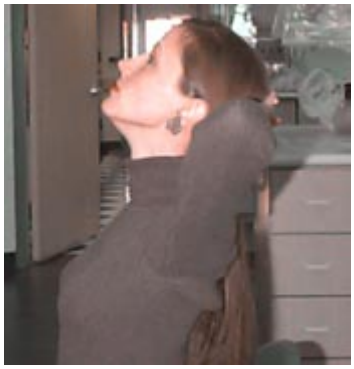
Stretching the back of the neck



Using the arm which is on the side of the tightness assume the position which is demonstrated, the head turning away from the pain (left image). The hand behind the head helps stabilize the head position. Take a deep breath, exhale slowly while bending the knees keeping the elbow where it is against the wall.

Another method for stretching the back of the neck can be accomplished by sitting down in a sturdy chair (right image). Turn the head away from the tight side, look down until a slight stretch is felt. Reach down with the hand on the tight side and hold onto the chair. With the other hand pull the head forward, gently.

Stretching the chest



Sit in a sturdy backed chair with the hands clasped behind the back of the head as demonstrated (see image, top left). Bring the elbows back as far as possible during a slow, deep breath in. While exhaling slowly bring the elbows together letting the head bend forward slightly (bottom left).

Another method for stretching this area is to stand facing a corner or a doorway with the arms in a "U" or a "V" against the wall or door posts (see right image). With the knees bent lean slightly forward from the ankles.

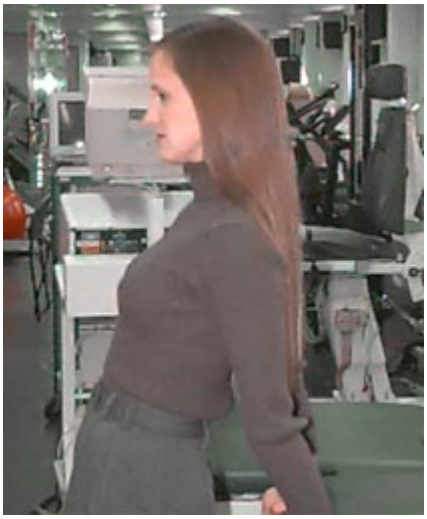
Stretching the side of the neck

Sit in a sturdy chair. Hold the underside with the arm of the tight side. Pull the head back making a double chin. Bend the head away from the tight side and turn the head toward the tight side. It won't go very far. Lean away from the arm holding onto the chair and reach with the opposite arm to the top of the head and gently pull to increase the stretch.

Stretching the shoulder and the chest

There are three exercises for this region:

1. Sit in a sturdy chair next to a table with the arm placed as demonstrated, palm down. Slide the arm forward while bending at the waist as far as is possible without pain. Eventually the head should be level with the side of the table.



2. Stand with back to the table and grasp the edge with the fingers facing forward. Bend the knees and lower the body allowing the elbows to bend. Let the knees do the work.

3. Sit on a firm and sturdy surface with the hand of the tight side grasping the edge. Lean away slowly.

Mobilization of the first rib

Use a large bath towel and grasp it at opposite corners. sling it across the shoulder of tightness and bring both ends across to the opposite hip or waist.

With the arm on that side pull gently downward then release slowly.

These stretches are not cures. They may help in alleviating some of the symptoms of thoracic outlet syndrome but as with any exercise program one should always consult a physician before beginning particularly when symptoms persist for any length of time.