



Thoracic Outlet Syndrome



THORACIC OUTLET SYNDROME

What is thoracic outlet syndrome?

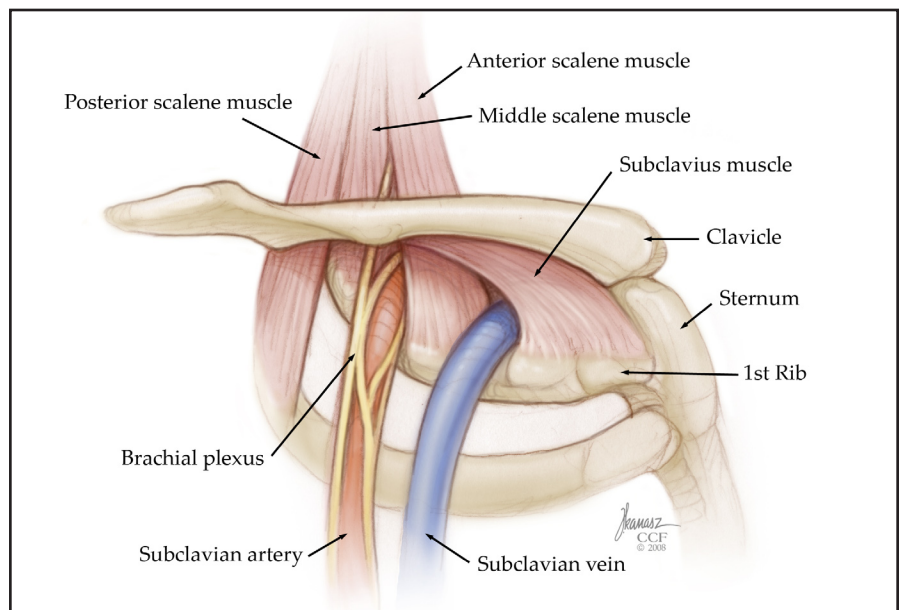
Thoracic outlet syndrome (TOS) is a term used to describe a group of disorders that occur when there is compression, injury, or irritation of the nerves and/or blood vessels (arteries and veins) in the lower neck and upper chest area. Thoracic outlet syndrome is named for the space (the thoracic outlet) between your lower neck and upper chest where this grouping of nerves and blood vessels is found.

What causes thoracic outlet syndrome?

The disorders caused by TOS are not well understood. Yet, it is known that when the blood vessels and/or nerves in the tight passageway of the thoracic outlet are abnormally compressed, they become irritated and can cause TOS. Thoracic outlet syndrome can be a result of an extra first rib (cervical rib) or an old fracture of the clavicle (collarbone) that reduces the space for the vessels and nerves. Bony and soft tissue abnormalities are among the many other causes of TOS.

The following may increase the risk of developing thoracic outlet syndrome:

- Sleep disorders
- Tumors or large lymph nodes in the upper chest or underarm area
- Stress or depression
- Participating in sports that involve repetitive arm or shoulder movement, such as baseball, swimming, golfing, volleyball and others
- Repetitive injuries from carrying heavy shoulder loads
- Injury to the neck or back (whiplash injury)
- Poor posture
- Weightlifting



thoracic outlet space

What are the symptoms?

The signs and symptoms of TOS include neck, shoulder, and arm pain, numbness or impaired circulation to the affected areas.

The pain of TOS is sometimes confused with the pain of angina (chest pain due to an inadequate supply of oxygen to the heart muscle), but the two conditions can be distinguished because the pain of TOS does not occur or increase when walking, while the pain of angina usually does. Additionally, the pain of TOS typically increases when raising the affected arm, which does not occur with angina.

Signs and symptoms of TOS help determine the type of disorder a patient has. Thoracic outlet syndrome disorders differ depending on the part of the body they affect. The nerves are the most common area affected, but TOS can also affect the veins and arteries (the least common type). In all types of TOS, the thoracic outlet space is narrowed and there is scarring around the structures.

Types of thoracic outlet syndrome disorders and related symptoms

- **Neurogenic thoracic outlet syndrome:** This condition is related to abnormalities of bony and soft tissue in the lower neck region (which may include the cervical rib area) that compress and irritate the nerves of the brachial plexus, the complex of nerves that supply motor (movement) and sensory (feeling) function to the arm and hand.

Symptoms include weakness or numbness of the hand; decreased size of hand muscles, which usually occurs on one side of the body; and/or pain, tingling, prickling, numbness and weakness of the neck, chest, and arms.

- **Venous thoracic outlet syndrome:** This condition is caused by damage to the major veins in the lower neck and upper chest. The condition develops suddenly, often after unusual and tiring exercise of the arms.

Symptoms include swelling of the hands, fingers and arms, as well as heaviness and weakness of the neck and arms. The veins in the anterior (front) chest wall may appear dilated (swollen).

- **Arterial thoracic outlet syndrome:** The least common, but most serious, type of TOS is caused by congenital (present at birth) bony abnormalities in the lower neck and upper chest.

Symptoms include cold sensitivity in the hands and fingers; numbness, pain or sores of the fingers; and poor blood circulation to the arms, hands and fingers.

Who is affected by thoracic outlet syndrome?

Thoracic outlet syndrome affects people of all ages and gender. The condition is common among athletes who participate in sports that require repetitive motions of the arm and shoulder, such as baseball, swimming, volleyball, and other sports.

Neurogenic TOS is the most common form of the disorder (95 percent of people with TOS have this form of the disorder) and it generally affects middle-aged women.

Recent studies have shown that, in general, TOS is more common in women than men, particularly among those with poor muscular development, poor posture or both.

How is thoracic outlet syndrome diagnosed?

Making a proper diagnosis is the most important step in treating TOS. Doctors who treat this condition include vascular surgeons, chest (thoracic) surgeons and vascular medicine physicians.

To diagnose your condition, your doctor will perform a complete physical exam and will review the results of previous diagnostic tests.

Is thoracic outlet syndrome serious?

Although many cases of thoracic outlet syndrome (TOS) can't be prevented, the condition is treatable. If left **untreated**, TOS can cause complications, such as:

- Permanent arm swelling and pain (especially in patients with venous TOS)
- Ischemic ulcer of the fingers (open sore caused by reduced blood flow)
- Gangrene (the death of body tissue, often caused by a loss of blood flow)
- Blood clot
- Pulmonary embolism (obstruction in a blood vessel due to a blood clot)
- Neurogenic complications, such as permanent nerve damage

How is thoracic outlet syndrome diagnosed?

In some cases, a thorough evaluation by a skilled neurologist may be recommended to rule out cervical spine disease or other neurological conditions that may be mimicking or causing your symptoms.

Additional tests performed to diagnose thoracic outlet syndrome include:

- Nerve conduction studies (to evaluate the function of the motor and sensory nerves)
- Vascular studies (of the arteries or veins)
- Chest X-ray to rule out cervical rib abnormalities
- Cervical spine X-rays to rule out a cervical rib (extra rib) or cervical (neck) spine abnormalities
- Computed tomography (CT) scan and magnetic resonance imaging (MRI) of the chest
- CT scan or MRI of the spine to rule out cervical spine impingement (pressure), which can mimic neurogenic thoracic outlet syndrome
- Magnetic resonance imaging with angiography (MRA) to view blood vessels
- Arteriogram/venogram (X-ray that uses dye to look at blood flow)
- Blood tests

How is thoracic outlet syndrome treated?

Early identification of TOS can help improve the success of treatment. Thoracic outlet syndrome treatments vary, depending on the type of TOS you have and your symptoms. The goals of treatment are to reduce symptoms and pain. Your health care provider will recommend the treatment option that is right for you.

Before choosing any treatment, it is important to talk to your health care provider about the potential benefits, risks and side effects of your treatment options.

Treatment of neurogenic thoracic outlet syndrome

- **Physical therapy:** The most common initial treatment for neurogenic TOS is physical therapy. Physical therapy increases the range of motion of the neck and shoulders, strengthens muscles and promotes better posture. Most patients experience an improvement in symptoms after undergoing physical therapy.

- **Medications:** For pain relief, over-the-counter pain medications, such as aspirin, acetaminophen (Tylenol), or ibuprofen (Motrin), may be recommended. Your doctor may prescribe a muscle relaxant for additional pain relief.
- **Surgery:** In some cases, surgery may be needed to treat neurogenic TOS if symptoms continue, despite an optimal course of physical therapy.

Treatment of venous thoracic outlet syndrome

To reduce the risk of blood clots and pulmonary embolism, treatment for venous TOS may include thrombolytic (clot-busting) or anticoagulant (blood thinning) medications and surgery. In many cases, the patient will be treated with thrombolytic medications and start anticoagulation therapy before surgery.

- **Thrombolytic medications** are given to dissolve blood clots. This type of medication is always given to the patient in the hospital so he/she can be closely monitored. The medication(s) may be injected directly into the vein or delivered via a catheter, a long slender tube, which is guided through the vein to the area where the blood clot is located. The clot-dissolving drug is sent through the catheter into the clot. The clot usually dissolves in a matter of hours to a few days. In some cases, the narrowed area of the vein will need to be treated with angioplasty (opening the vein using a balloon) to keep more clots from forming. Surgery is often recommended after the clot in the vein has been effectively treated/dissolved.
- **Anticoagulant medications** decrease the blood's ability to clot and they keep more clots from forming. Anticoagulant medications include warfarin (Coumadin), heparin, low-molecular weight heparin and fondaparinux (Arixtra). You will receive information about how to take the anticoagulant medication that is prescribed for you.
- **Surgery** may be necessary along with medications to manage your symptoms. Surgery corrects the narrowing that is causing problems with the vein and may be recommended after the clot in the vein has been effectively treated/dissolved with medications.

Treatment of arterial thoracic outlet syndrome

- **Surgery:** Patients with arterial TOS often require surgical treatment. Surgery may be performed to remove the first rib and make more room for the vessels and nerves. Surgery may also be performed to repair any structural problems of the artery.
- **Thrombolytic medications** may be given before surgery, if necessary, to dissolve blood clots. This type of medication is always given to the patient in the hospital so he/she can be closely monitored. The medication(s) may be injected directly into the artery or delivered via a catheter, a long slender tube, which is guided through the artery to the area where the blood clot is located. The clot-dissolving drug is sent through the catheter into the clot. The clot usually dissolves in a matter of hours to a few days. In some cases, the narrowed area of the artery will need to be treated with angioplasty (opening the artery using a balloon) to prevent more clots from forming.

When is surgery necessary?

Although only 10 to 20 percent of patients with TOS need surgical treatment, most patients with *venous* or *arterial* TOS will need surgical treatment.

Surgery for venous and arterial TOS is very effective. Among patients with venous TOS, elective surgery corrects symptoms in 90 to 95 percent of cases; elective surgery resolves symptoms in more than 95 percent of patients with arterial TOS.

Some patients with neurogenic TOS will need surgery. The primary goal of surgery for these patients is to remove the source of compression on the spinal nerves that supply stimulation to the arm, forearm and hand (known as the brachial plexus). This is

typically accomplished by removing the first rib, abnormal muscles or fibrous bands. If there is an extra rib causing compression, it may also be removed.

Known as “decompression surgery,” the procedure is typically completed by making an incision in the underarm area on the affected side. It can also be performed through an incision made above the clavicle (collarbone). An alternative surgical approach known as video-assisted thoracoscopic surgery (VATS), which is performed through several small incisions, may be used in some cases.

Surgical risks

Like all extensive surgical procedures, there are risks associated with decompression surgery. One significant risk is the failure to respond to surgery. In experienced centers, approximately 50 to 70 percent of patients will have improvement in their symptoms after decompression surgery. For this reason, surgery to treat neurogenic TOS is reserved for those patients who remain debilitated despite appropriate noninvasive therapy, including supervised physical therapy, and pain relief. Other complications are rare, occurring in only 2 to 3 percent of cases, but include:

- Nerve injury
- Bleeding
- Pneumothorax (collapsed lung)
- Lymphatic fluid leakage

Length of hospital stay

Following surgery, you will stay in the hospital for one night, and in some cases, an additional day. During your recovery, you will begin physical therapy to help you gain function and minimize pain and the recurrence of symptoms.

VASCULAR MEDICINE

Appointments: 216.444.4420 or
800.223.2273 ext. 44420

VASCULAR SURGERY

Appointments: 216.444.4508 or
800.223.2273 ext. 44508

THORACIC SURGERY

Appointments: 216.445.6860 or
800.223.2273 ext. 56860

This information is not intended to replace the medical advice of your doctor or health care provider. Please consult your health care provider for advice about a specific medical condition.



Cleveland Clinic

9500 Euclid Avenue, Cleveland, Ohio 44195
www.clevelandclinic.org/heart

Hearing Impaired (TTY) Assistance: 216/444-0261

© 2010 Cleveland Clinic. All rights reserved.

Rev. 1/10