



Thoracic Outlet Syndrome

What is Thoracic Outlet Syndrome?

Thoracic outlet syndrome is an umbrella term for 3 entirely different conditions:

1. Neurogenic thoracic outlet syndrome (N-TOS)
2. Venous thoracic outlet syndrome (V-TOS)
3. Arterial thoracic outlet syndrome (A-TOS).

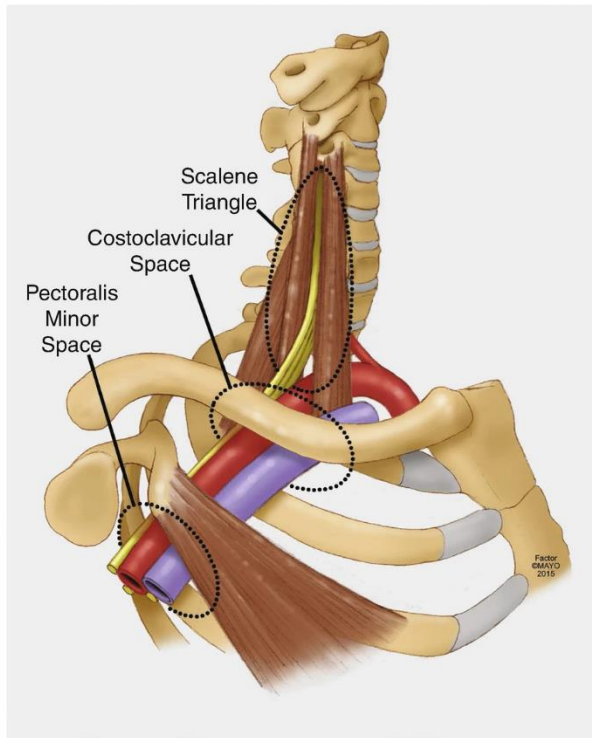
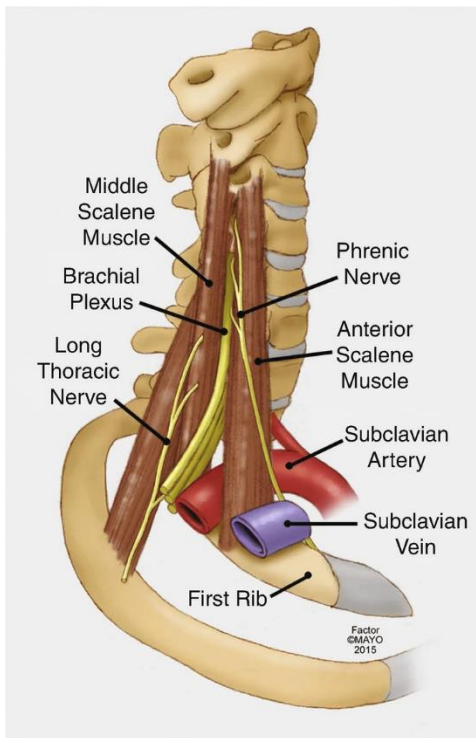
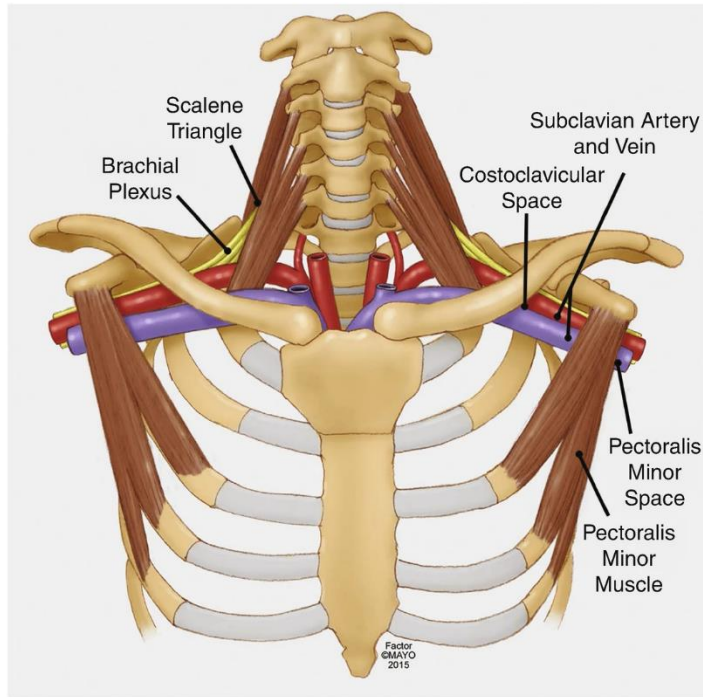
All of these different conditions share a common name due to the fact that they are conditions related to compression of various structures in the “thoracic outlet”, which is the area above the collarbone.

Symptoms

N-TOS is the symptomatic compression and irritation of the brachial plexus, which is a collection of nerves in the base of the neck, which connect together to innervate the upper limb. This compression occurs between the scalenus anterior muscle, the scalenus medius muscle, and the first rib (see diagram). Sometimes the compression may be due to an extra rib in the neck, called a cervical rib. The nerve irritation results in arm pain, altered sensation, numbness and weakness. These symptoms are usually provoked by arm elevation and use.

V-TOS is the compression of the subclavian vein as it passes between the first rib and the collarbone. This results in trauma and scarring of the subclavian vein, which may lead to clotting (upper limb DVT). This presents with arm swelling, blueish discolouration, and discomfort.

A-TOS is the compression and damage to the subclavian artery between the scalenus anterior muscle and the first rib. This can lead to reduced flow or clots in the artery to the upper limb, which leads to pain and pallor.



Causes

Exactly why TOS occurs in certain individuals is unknown. Overall, it is thought to be a combination of predisposing anatomical factors, with some form of neck trauma. This neck trauma can range from physical trauma (eg motor vehicle accident) through to repetitive neck or upper limb activities at the workplace, or sport.

Diagnosis

The different types of TOS are diagnosed very differently. Arterial and venous TOS are diagnosed reasonably easily with ultrasound or CT scans.

N-TOS, however, is notoriously difficult to confidently diagnose. The diagnosis is made from a combination of the patient history (symptoms), and a specific set of examination findings, as well as ruling out other pathology using nerve conduction studies (NCS), MRI scans, and often some other imaging. It is important to note that there are multiple other conditions which may cause symptoms overlapping with N-TOS. These other conditions are in fact much more common than N-TOS itself.

Treatment

N-TOS should always initially be managed with ergonomic workplace changes and physiotherapy. If this is not successful, then a trial of a Botox injection into the scalenus anterior muscle can be performed. This injection paralyses the muscle mainly responsible for the nerve irritation, for approximately 3 months. This may enable more physiotherapy, which may help to prevent the recurrence of pain. If and when the pain returns, patients will often proceed to surgery. This procedure involves operating just above the collarbone to remove part of the scalenus anterior muscle and the first rib, to free up as much space as possible for the nerves to pass through.

V-TOS is often treated initially with thrombolysis (“clot-busting”) if there is a DVT. Then, to ensure the vein does not clot again, surgery is performed to remove the first rib, to free up space for the vein.

A-TOS is treated with surgery. This involves freeing up the subclavian artery and removing the first rib. In addition, often the artery itself will need to be repaired or bypassed.

Outcomes of Surgery

TOS decompression surgery is invasive. It almost always involves resection of a large part of the first rib at the top of the chest. It should always be held as a last resort for that reason.

The outcomes of surgery for V-TOS and A-TOS are usually very good, with resolution of the symptoms, and a very low recurrence rate. Surgery is only performed if the arm symptoms are severe enough to get a good benefit from surgery.

As mentioned above, the diagnosis and treatment of N-TOS is an inexact science, and there are almost always other pains and symptoms which are not directly related to the nerve compression. This means that the outcomes of surgery for N-TOS are far from guaranteed. If the patient’s symptoms, examination and testing all clearly points to N-TOS, there is still approximately only an 80% chance of a good improvement in symptoms. This rate decreases if there is more inconsistency with the history, examination and investigations (this includes response to Botox). Mostly one would expect the nerve pains and sensory

changes in the arm to decrease. The pains around the shoulder region and into the neck are unpredictable in their improvement.

Risks of Surgery

Nerve injury – injury to the brachial plexus causing persistent weakness or numbness of the arm; injury to the phrenic nerve, causing paralysis of one side of the diaphragm which helps with breathing; injury to the long thoracic nerve, causing “winging” of the scapula. These nerve injuries are usually temporary, but in rare cases can be permanent.

Pneumothorax - collapsed lung. This is usually anticipated by placing a drain in the wound and ensuring no air is leaking out before its removal.

Wound infection – this may require antibiotics, or in rare cases, a return to theatre for drainage.

Bleeding or haematoma in the wound – this usually settles by itself, but may require reoperation.

Lymphatic fluid leakage from the wound – this clear (or sometimes milky) fluid may leak from the wound for some time. This usually settles by itself but occasionally requires reintervention.

As you can see, the management of thoracic outlet syndrome is complex. If you would like to discuss this any further, please ask Dr Ward-Harvey to explain it further, or to address any specific concerns.