Clinical Integration of Osteopathic Manipulative Medicine

Thoracic Outlet Syndrome

Author: Daniel Pasternack OMS-III, Sheldon C. Yao, DO

Introduction:

Thoracic Outlet Syndrome (TOS) is a complex disease typically presenting as a combination of several upper extremity symptoms. TOS is a relatively common disease, estimated to affect 8% of the population. It arises from neurovascular impingement within the thoracic outlet, an anatomic tunnel serving as the passage between the thorax, neck, and upper extremity. Structures traversing the thoracic outlet include the subclavian artery and vein, the brachial plexus, and the thoracic duct. Symptoms may arise from the occlusion of any one or all of the structures. There are two classical variations of the disease, one arising from vascular occlusion, and the more common version arising from neurologic occlusion. Further complicating matters, patients may also present with a combination of both vascular and neurologic symptoms. In addition to the variable presentations, TOS can result from an even wider variation of pathologies, ranging from minor to severe, each with their own optimal treatment modality.

Osteopathic Manipulative Treatment (OMT) can be a natural first step in the treatment of TOS. By its nature, OMT can provide an individualized approach to the collection of conditions that fall under the TOS umbrella. While treatments utilizing the circulatory or neurologic models can be used to directly benefit various TOS symptoms, treatments utilizing the musculoskeletal model may alleviate the underlying pathology such as muscle hypertonicity or fascial strain.

Clinical Presentation:

Vascular Symptoms

- Absent/decreased upper extremity pulses
- Swelling and edema in the upper extremity
- Coldness and cyanotic appearance of the upper extremity
- Pain on activity (claudication) of the upper extremity
- Paresthesia of the upper extremity (typically starting distal and spreading proximal due to ischemia)

Neurological Symptoms
• Weakness in muscles of the shoulder, arm, forearm, and/or hand
• Numbness in upper extremity, sometimes including neck, cheek, or earlobe (typically based on dermatome of impinged nerve)
• Pain in upper extremity, sometimes including neck, head, or chest
• Rarely: dizziness, vertigo, blurred vision

**Differential diagnosis:** ²,⁵,¹⁰

• Angina or ischemic heart disease
• Brachial plexus injury
• Carpal tunnel syndrome or de Quervain tenosynovitis
• Cervical disc injury
• Cervical radiculopathy
• Deep vein thrombosis
• Esophageal reflux
• Overuse syndromes (elbow/forearm)
• Raynaud’s disease
• Rotator cuff tear or strain
• Shoulder impingement

**Clinical pearls:**

• Most TOS patients experience neurological symptoms, with just 5% experiencing vascular symptoms. ¹,¹⁰
• The mean age of TOS patients is in the 40’s, so it is not a typical pediatric diagnosis. ¹,¹⁰
• In addition to muscle hypertonicity and fascial strain causing TOS, trauma and anatomical variants such as accessory muscles or bones can also cause the syndrome. These latter causes could lead to more severe symptoms that may require surgery.¹
• Since TOS is almost purely a clinical diagnosis, there is much controversy surrounding the syndrome. Some physicians believe TOS is over-diagnosed, while others disagree.

**OMM Integration:**

Conservative therapy, including OMT, is very effective in the treatment of TOS. Studies found that between 59 and 88% of TOS patients achieved ‘good’ or ‘very good’ results at least one year following treatment with such techniques.⁸,⁹ In treating a TOS patient, the physician should take care in identifying the underlying cause(s) or potential cause(s) of the syndrome in each individual. While surgery may ultimately be required for some patients, especially those with an anatomic variation causing their symptoms, OMT can be successful in both the long-term for some and short-term for many.

There are two overall goals of treating the TOS patient. The first is to use techniques that stretch and otherwise decrease the hypertonicity of muscles in the neck and pectoral region that may be impinging the thoracic outlet, including the normalization of the respiratory motion of ribs 1 and 2. However, TOS symptoms have a tendency to recur. Thus, the second goal is to educate the
patient on proper posture to prevent recurrence of the syndrome. The physician may also provide exercises for the patient to do at home to encourage muscle flexibility.\textsuperscript{3,6,7,8,9}

Absent in the literature is the discussion of potential conservative treatments for the vascular symptoms of TOS. For example, patients presenting with edema may benefit from the arm wobble technique. While the neurological symptoms are more widely seen both in the literature and in the clinic, this example shows the importance of the physician approaching each patient in a flexible and individualized manner.

**Osteopathic Structural Examination:**\textsuperscript{2,3} Structural examination of the upper extremity, cervical region, and upper thoracic regions should be performed, looking for dysfunctions in:

- Cervical and upper thoracic spine
- Clavicle
- Glenohumeral joint
- Scapula
- Respiratory motion of ribs 1 and 2
- Scapula
- Scapula release
- Rotator cuff muscles (Supraspinatus, infraspinatus, teres minor, subscapularis)
- Special tests:
  - Spurling’s test
  - Adson’s test
  - Roos’ stress test
  - Wright’s test

**Possible Treatments Options:**\textsuperscript{3,4,8}

- Cervical and upper thoracic myofascial techniques
- Myofascial or balanced ligamentous tension (BLT) release of the thoracic outlet
- Scapula release
- Wobble technique (lymphatic drainage of the upper extremity)
- Treatment of anterior & posterior cervical/thoracic tenderpoints with counterstrain or facilitated positional release
  - Posterior C3 may be of interest (scalen muscle)
- Muscle energy for rib 1 or 2 if dysfunction identified
- Muscle energy for pectoralis major and/ minor

**Citations:**


