

# Thoracic Outlet Syndrome (TOS)



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CME Disclosures: None

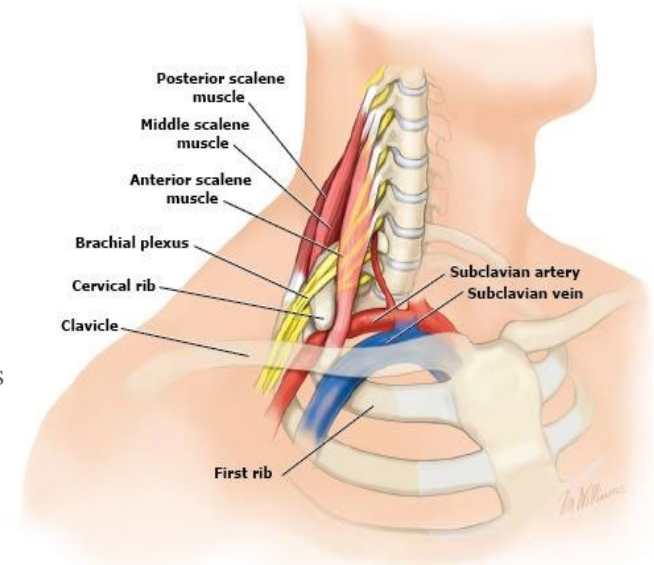
# Patient Case:

36 year-old female presenting with **left neck and arm pain** worsening over the past few years associated with weakness, numbness, and tingling.

- **Relevant PMHx:** Anxiety, depression, cervical herniated disk s/p discectomy, PVD, Raynaud's phenomenon
- **Location:** Left side of neck, collar bone, shoulder, radiating down left upper extremity
- **Onset/duration:** Pain minimally present for years, however, in 2022, acutely worsened after a Pilates session and continued to worsen since then.
- **Prior treatments:** cervical discectomy, NSAIDs, muscle relaxants, anti-depressants, gabapentinoids, and opioids
- **Imaging:** MRI of cervical spine (2021) revealed prior disc replacement at C5-C6; and degenerative disc disease at C4-C5 and C6-C7 resulting in mild spinal canal and right asymmetric foraminal narrowing.

# Pathophysiology of TOS

- The thoracic outlet exists above the first rib and behind the clavicle. It is bordered by the spinal column, sternum, and first rib.
- The major subgroups of TOS include:
  1. Neurogenic (most common) (nTOS)
    - Occurs from compression of the brachial plexus
    - Accounts for 95% of cases
    - Symptoms include UE weakness, numbness and dysesthesias
  2. Venous Compression
    - Occurs from compression of the subclavian vein
    - Accounts for 3% of cases
    - Symptoms include UE DVT and UE swelling
  3. Arterial Compression
    - Occurs from compression of the subclavian artery
    - Accounts for 1% of cases
    - Symptoms include thromboembolism, arterial thrombosis, and claudication



Goshima, K. (n.d.). *Overview of Thoracic Outlet Syndromes*. UpToDate. <https://www.uptodate.com/contents/overview-of-thoracic-outlet-syndromes#!>

# Diagnosis of TOS

- For arterial or venous TOS, diagnosis is supported by demonstration of stenosis or occlusion of the corresponding subclavian vessel on imaging.
- Electrophysiological testing, or EMG, is the diagnostic tool for neurogenic TOS, although the majority of patients with neurogenic TOS will still test negative.
- EMG for neurogenic TOS is specific, but not sensitive.
- This patient underwent EMG testing, which was consistent with mild left median neuropathy at the wrist, but negative for left cervical radiculopathy, brachial plexopathy, or other mononeuropathy/polyneuropathy.
- Provocative maneuvers such as Adson's, costoclavicular, and hyperabduction may also aid in diagnosis of TOS



Figure 1 Adson's maneuver (modified).

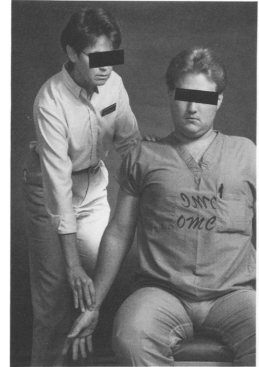


Figure 2 Costoclavicular maneuver.



Figure 3 Hyperabduction maneuver.

Rayan GM, Jensen C. Thoracic outlet syndrome: provocative examination maneuvers in a typical population. *J Shoulder Elbow Surg.* 1995 Mar-Apr;4(2):113-7. doi: 10.1016/s1058-2746(05)80064-3. PMID: 7600161.

# Management of TOS

- 25/42 patients with nTOS who completed 1 month of **physical therapy** saw **improvement** of symptoms. No studies exist that compare pharmaceutical therapy to physical therapy, but a combined approach has **reduced** 60-70% of symptoms in patients with nTOS<sup>1</sup>.
- A clinical, placebo-controlled, randomized, double-blind trial of **ropivacaine injection into the anterior and middle scalene muscles** found a statistically significant improvement in functionality at 4 weeks, and maintained until the 12<sup>th</sup> week in 19 patients?<sup>2</sup>
- A double-blind, randomized, controlled trial of **botulinum toxin injection** in the anterior and middle scalene muscle reported **no statistically significant** improvement in pain, paresthesia, or function<sup>3</sup>.
- Symptomatic patients who have failed nonoperative therapy may benefit from **surgical decompression** such as first rib resection.<sup>4</sup>

# Patient Outcomes

- An anterior scalene muscle injection with 80 mg of lidocaine 2% with epinephrine provided about 90% reduction in pain for 1-7 days.
- Subsequently, an interscalene injection with 100 mg of lidocaine 2% with epinephrine and 10 mg of dexamethasone provided about 50% reduction in pain for 14 days.
- Ultimately, patient opted for left first rib resection which has resulted in significant reduction in pain and oral analgesic requirements.

# References

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2. Rached, R., Hsing, W., & Rached, C. (2019). Evaluation of the efficacy of ropivacaine injection in the anterior and middle scalene muscles guided by ultrasonography in the treatment of Thoracic Outlet Syndrome. *Revista da Associação Médica Brasileira* (1992), 65(7), 982–987. <https://doi.org/10.1590/18069282.65.7.982>
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4. Goshima, K. (n.d.). *Overview of Thoracic Outlet Syndromes* UpToDate. <https://www.uptodate.com/contents/overview-of-thoracic-outlet-syndromes#!>