Diagnosis and Optimal Treatment for Neurogenic Thoracic Outlet Syndrome:

The Supraclavicular Approach is Best—How To Do It Well

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Thoracic Outlet Syndrome

Neurogenic TOS

Arterial TOS

Venous TOS

TIP: Diagnosis is Based on Multiple Criteria

No Relationships to Disclose

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No Relationships to Disclose
Disabling Symptoms
Appropriate Clinical Diagnosis
Insufficient Response to Conservative Management

Careful Patient Selection, a Good Operation, and Comprehensive Care Are The KEYS to Successful Outcomes

**Indications for Surgical Treatment**

**Supraclavicular Decompression**

- Critical View #1
  - Surgeon’s View, Left Side

- TIP: Diaphragmatic Startle (“Dartle”) Response Helps Identify the Phrenic Nerve

- TIP: Use a Henley Self-Retaining Retractor to Maintain Exposure

- Resection of Omohyoid Muscle
- Exposure of Anterior Scalene Muscle
- Preservation of Phrenic Nerve
- Lateral Reflection of Scalene Fat Pad

**Supraclavicular Decompression**

- Incision Above and Parallel to Clavicle
- Raise Short Subplatysmal Flaps
- Expose Scalene Fat Pad
- Don’t Divide SCM

**Critical View #1**

- Surgeon’s View, Left Side

- Internal Jugular Vein (IJV)
- Phrenic Nerve (PhN)
- Anterior Scalene Muscle (ASM)
- Subclavian Artery (SCA)
- Brachial Plexus (BP)
- Middle Scalene Muscle (MSM)
- Long Thoracic Nerve (LTN)

- TIP: Prep the Entire Arm in TOS Cases for Mobility and Access to the Hand

In: Mulholland et al, Operative Techniques in Surgery, 2015
THORACIC OUTLET SYNDROME  NEUROGENIC TOS  ARTERIAL TOS  VENOUS TOS

**Gently Pass Fingertip Behind ASM to Protect Subclavian Artery and Brachial Plexus**

**Retract Phrenic Nerve Medially**

**Divide ASM From First Rib with Scissors Not Cautery**

**Anterior Scalenectomy**

In: Mulholland et al, Operative Techniques in Surgery, 2015

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**Complete Anterior Scalenectomy**

In: Mulholland et al, Operative Techniques in Surgery, 2015

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**TIP: “Phrenic Flip” Moves the ASM to the Medial Side of the Phrenic Nerve, Allowing Easy Dissection to the ASM Origin (C6) at the Apex of the Scalene Triangle**

In: Mulholland et al, Operative Techniques in Surgery, 2015

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**Mobilize Brachial Plexus From Middle Scalene Muscle**

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**Middle Scalenectomy**

**Protect the Long Thoracic Nerve While Dividing Middle Scalene Muscle**

**TIP: Must Visualize the C8 and T1 Nerve Roots as They Form the Lower Trunk**

In: Mulholland et al, Operative Techniques in Surgery, 2015

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**First Rib Resection (Posterior)**

**TIP: Use Rongeur to Resect Posterior First Rib Behind C8/T1**

**TIP: Resect a Small Sliver of First Rib to Allow Mobility Once Divided**

In: Mulholland et al, Operative Techniques in Surgery, 2015
First Rib Resection (Anterior)

TIP: Divide First Rib Underneath the Clavicle Just Medial to the Scalenus Tubercle

TIP: Push the Posterior First Rib Down to Open the Costoclavicular Space

Operative Specimens from Supraclavicular Decompression

In: Mulholland et al, Operative Techniques in Surgery, 2015

Complete Brachial Plexus Neurolysis (5 Roots/3 Trunks)

TIP: Wrap the Brachial Plexus with an Absorbable Film to Suppress Postoperative Perineural Scar Tissue (A Major Cause of Recurrence)

Pectoralis Minor Tenotomy

TIP: Include Pectoralis Minor Tenotomy When Subcoracoid Exam Findings are Present (75-85% of NTOS)

In: Mulholland et al, Operative Techniques in Surgery, 2015

No Operation for TOS Produces Perfect Results in All Patients

Standardized Comprehensive Postoperative Care is Just as Critical to Good Outcomes as the Type of Surgical Treatment

Even the Most Successful Operation is Subject to the Potential for Recurrence

"All Things Being Equal, the Simplest Solution Tends To be the Best One" -William of Ockham

"Make Everything As Simple as Possible, But Not Simpler" -Albert Einstein

"If This Was Easy It Wouldn’t Be So Hard" -Yogi Berra

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