Thoracic Outlet Syndrome

“TOS”

Introduction

• The term TOS is used to describe patients with compression of the brachial plexus, subclavian vein, subclavian artery in the region of the thoracic inlet.

• The name itself is confusing and misrepresentative because anatomically the area of compression between the scalene muscles and the first rib is termed correctly the thoracic inlet.

Etiological Factors of Neurovascular Compression Syndromes.

Cervical Rib:

0.5-1% population, no more than 10% of people who have cervical ribs develop TOS.

Neurogenic symptoms 95% usually ulnar nerve C8-T1 is usually affected

Vascular Symptoms 5% : Subclavian artery, Subclavian vein
Sequel of Neurovascular Compression may result in either of the following:

- True Neurological TOS ~90
- Venous Vascular TOS ~ 4%
- Arterial Vascular TOS ~ 1%
- Traumatic Neurovascular TOS ~ 5%

**Neurogenic Symptoms of TOS:**

- Pain, paraesthesia, weakness, coldness of the arm after prolonged hyperabduction
- Motor weakness or wasting in the hand and arm—the interossei & thenar muscles
- Loss of sensation to light touch & pin prick
- Pallor of fingers with elevation & exercise
- Trophic changes
- Pressure & light percussion over brachial plexus:
  - pain & tenderness

**Vascular Symptoms of TOS**

Subclavian artery compression may lead to intermittent claudication and may lead to stenosis, post-stenotic dilatation or aneurysm formation and distal micro-embolisation

Venous symptoms due to compression of Subclavain vein:

- Swelling, cyanotic changes & heaviness of arm
  - *Precipitated by arm exercise or elevation*
  - *Relieved by rest*
- Thrombosis of axillary or subclavian vein causes the symptoms.
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**TOS Maneuvers:**

Reduction or obliteration of radial pulse &/or subclavian bruit

- Hands-up Test “Roos Test”
- Adson or Scalene Maneuver
- Costoclavicular Maneuver
- Allen Test
- Military Position

**Differential Diagnosis of TOS**

1. Raynaud's disease and syndrome

2. **Carpal tunnel syndrome:**

3. **Ulnar nerve compression:**

4. **Rotator cuff tendinitis:**

7. **Fibromyositis**

8. **Cervical disk disease**

9. **Cervical arthritis**

**Investigations**

- Chest x-ray
- Cervical spine x-ray
- Nerve conduction studies
- Doppler / Duplex studies
- MRA / Angiogram with arm abduction
- UNCV
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Treatment of TOS

- Conservative by physiotherapy
- Minimal invasive by Botulinum toxin injection or by local anesthetic injection
- Surgery

Indications for Surgery:
- Failure of 3-6 months conservative therapy
- Significant reduction of function affecting job, life-style
- Serious venous or arterial complications:
  - Claudication
  - Thrombo-embolism
  - Critical ischaemia

- Surgical Treatment of TOS

Depending on the surgeon’s preference, there are 2 approaches for the surgery:

- Supraclavicular approach:
  - Scalenectomy or Scalenotomy
  - Excision of a cervical rib and fibrous bands
  - Excision of 1st rib & fibrous bands
  - Brachial plexus neurolysis
  - Repair of subclavian artery if it’s injured and patient has vascular problems:
    - Thrombectomy, patch angioplasty
    - Excision of aneurysm & bypass graft
    - Endovascular stent-graft

- Transaxillary approach:
  - Excision of 1st rib.