The Management of Thoracic Outlet Syndrome: Acute

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Disclosures
None relevant to this discussion

Thoracic Outlet Syndrome
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Venous TOS
- Acute
- Mechanical Compression or occlusion of the subclavian vein
  - Thrombotic or nonthrombotic
  - AKA Paget-Schroetter Syndrome or Effort Thrombosis
- Costoclavicular Space Pathology
  - Between Clavicle and First rib
  - Between the anterior scalene muscle and the subclavius muscle

Non occlusive:
- Intermittent, positional, arm discoloration, swelling and aching
- Elicited by exercise or arm elevation

Neutral position
Abduction, external rotation, head toward the affected side

Thrombotic (Most common)
- Sudden onset
- Aching, swelling, heaviness, bluish discoloration
- History of vigorous exercise
- Visible superficial collateral veins shoulder/chest wall

IMAGING
- Duplex Ultrasound
- Venography
  - Diagnostic and therapeutic
- Axial Imaging

Provocative views are essential to make the diagnosis
VTOS Clinical Goals

- Eliminate Symptoms
- Prevent long-term disability
- Avoid the need for long term anticoagulation

Contemporary treatment of VTOS
Acute Subclavian Vein Thrombosis

1. Restoration of venous patency
   1. Thrombolysis
2. Elimination of extrinsic compression
   1. First rib resection and venolysis
3. Correction of venous stenosis
   1. Balloon angioplasty
   2. Stents
   3. Surgical vein reconstruction

Anticoagulation alone does not work

- Original standard of care
- Poor outcomes
  - Persistent vein occlusion 78%
  - Persistent symptoms 41-91%
  - Permanent disability 39-68%


What about if they have spontaneous VTOS?

A substantial number of patients will remain symptomatic based on clinical reporting or by ultrasonographic grade.

Scores from an 11-point numerical rating scale are plotted against ratings on a 6-point descriptive scale.
Grade 0: normal flow; grade 1: moderate obstruction; grade 2: severe obstruction or occlusion of the axillary–subclavian vein.
Contemporary treatment of TOS

Consensus that most patients are best treated with a combination of early thrombolysis, surgical decompression, correction of vein stenosis, and a variable period of post-operative anticoagulation.

Contemporary outcomes for 1st rib resection for VTOS

<table>
<thead>
<tr>
<th>Author</th>
<th>#</th>
<th>Approach</th>
<th>Patency</th>
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<tr>
<td>Schneider 2015</td>
<td>33</td>
<td>IC</td>
<td>91% (PP)</td>
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<tr>
<td>Molena 2007</td>
<td>97</td>
<td>IC</td>
<td>100% (PA)</td>
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<tr>
<td>Schneider 2004</td>
<td>25</td>
<td>IC</td>
<td>92% (PP)</td>
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<tr>
<td>Azakie 1998</td>
<td>20</td>
<td>SC</td>
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<td>Donelan 2009</td>
<td>67</td>
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<tr>
<td>Urschel 2000</td>
<td>199</td>
<td>TA</td>
<td>95% (Clinical)</td>
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</tbody>
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PP primary patency, PA primary assisted patency

Ongoing controversies: Timing of Surgery

- Immediate or delayed
- Delayed to allow resolution of inflammation
  - Re-thrombosis rate of 6% to 18% during waiting period (Adams 1971, Machleder 1993, Hurlbert 1995)

Focusing the surgical approach to TOS

- Supraclavicular
- Paraclavicular
- NTOS
- Arterial TOS
- Infraclavicular
- VTOS
Potential Advantages of Infraclavicular Approach

- Direct access (to vein within the costoclavicular space)
- Focused approach (minimizes exposure of brachial plexus, subclavian artery, & thoracic duct)
- Preserve supraclavicular and axillary venous collateral pathways
- Ability to access the central veins using transmanubrial extension for vein reconstruction

Adjunctive Endovascular Procedures

- Intraoperative venography
- PTA ± stent

Adjunctive Surgical Procedures

- Saphenous vein patch
- Cryopreserved aortic homograft ± arteriovenous fistula

Postoperative anti-coagulation

To anti-coagulate or not to anti-coagulate.

- Depends:
  - If on completion venogram following the 1st rib resection, the vein looks very good with no residual stenosis consider no anticoagulation
  - Otherwise, three to six months of anti-coagulation
Conclusions

- Thrombolysis followed by 1st rib resection is the current standard of care for patients with VTOS and acute subclavian vein thrombosis
- Focused infraclavicular 1st rib resection is safe, effective, and provides potential advantages for the treatment of VTOS
- Early identification and treatment leads to the best outcomes
- Patients presenting with subacute or chronic thrombosis do not do as well but may benefit from 1st rib resection and anticoagulation

Thank You For Your Attention