An Algorithm For The Treatment Of Paget-Schroetter’s Syndrome

Thomas S. Maldonado MD
Professor of Surgery
New York University Langone Medical Center
Division of Vascular and Endovascular Surgery

Upper Extremity Deep Venous Thrombosis

- 4-10% of all causes of venous thrombosis
- 30% primary DVT includes: Thoracic Outlet Syndrome, Effort Thrombosis, Idiopathic Venous thrombosis
- 70% Secondary DVT includes: Central Venous Catheters, Transvenous Pacemakers, Cancer (thrombophilia)

Venous Thoracic Outlet Syndrome Signs and Symptoms

- Arm Swelling
- Reddish-blue discoloration
- Pain
- Sudden onset
- Prominence of subcutaneous collateral veins along ipsilateral chest wall and shoulder girdle (especially if occlusion is chronic)

Diagnostic Studies for TOS

- In a recent randomized trial, for example, a duplex scan was found to have a sensitivity of 78% to 100% and a specificity of 82% to 100%.

MRA with Contrast (Venous)

Arms Adducted
Arms Abducted
VENOUS THORACIC OUTLET SYNDROME

- The key anatomic structures contributing to compression of the subclavian vein and recurrent venous trauma are:
  - The first rib
  - The clavicle with its associated subclavius muscle and fibrous costocoracoid ligament
  - The anterior scalene muscle and tubercle

Treatment

- Anticoagulation alone: associated with significant long-term morbidity and patient disability
- Acute PE (6-15% of cases)
- Residual occlusion and persistent symptoms/disability (PTES) in 41-91% of patients

- Catheter-directed thrombolysis: If thrombolysis is initiated within 14 days of the onset of symptoms, the results are generally reported to be excellent
- Thrombolysis in patients with greater than 14 days of symptoms is possible, but with decreased chance for successful re-establishment of luminal patency
Post-thrombolysis

- **Unsuccessful Thrombolysis**: Persistent total occlusion of the subclavian-axillary vein
  - Almost always seen in patients who have had repeated episodes of lysis, anticoagulation, and rethrombosis
  - Management is with Warfarin anticoagulation and control of local symptoms (compression/elevation/rest)
  - Surgical decompression (Controversial)

- **Successful Thrombolysis**: re-establishment of subclavian-axillary vein patency

  - Patients with external compression:
    - Immediate thoracic outlet decompression with or without venography and angioplasty of persistent venous stenosis
    - Followed by 3-6 months of anticoagulation

  - Patients with external compression:
    - Immediate thoracic outlet decompression with or without venography and angioplasty of persistent venous stenosis
    - Followed by 3-6 months of anticoagulation

  - Patients without evidence of external compression:
    - 3-6 months of anticoagulation therapy
Stents have no role in the treatment of vTOS before surgical decompression
• The radial force associated with either a self-expanding or balloon-expandable stent is not adequate to compensate for the compressive force between the first rib and clavicle
• Stent deformation/fracture/thrombosis are common in this setting

Deformed balloon-expandable stent 6 weeks after treatment of primary subclavian-axillary thrombosis

Transaxillary 1st Rib Resection
• A: Transaxillary division of the anterior scalene muscle
• B: Detachment of the middle scalene muscle
• C: Removal of the first rib

Table II. Total 9 following thrombolysis

| Group                        | Remaining Patency (%) | P vs. not removed
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibrinolytic (7)</td>
<td>95/95</td>
<td>0.0001</td>
</tr>
<tr>
<td>Fibrinolytic + TPA (13)</td>
<td>68/68</td>
<td>0.0001</td>
</tr>
<tr>
<td>Rib not removed (16)</td>
<td>84/63</td>
<td></td>
</tr>
</tbody>
</table>

40% of patients in the rib not removed group eventually required surgery for recurrent symptoms

Conclusions: In patients with acute effort thrombosis who undergo thrombolysis, permanent symptom relief and long-term patency are more likely to be achieved in patients who undergo trials with or without endovascular balloon venoplasty than those whose rib is left intact.
Routine Venography Following Transaxillary First Rib Resection and Scaleneectomy (FRRS) for Chronic Subclavian Vein Thrombosis Ensures Excellent Outcomes and Vein Patency

Kevin Z. Chang, BA1, Kendall Liree1, Jasmin Dorsa, CRNP1, James H. Black, III, MD1, and Julie A. Freischlag, MD2

Abstract

To assess the role of postoperative venography in patients treated with first rib resection and scaleneectomy (FRRS) for chronic subclavian vein thrombosis (SVT), we performed a retrospective review of the mean 6 months, range 1 week to 5 years

- Majority of patients with chronic subclavian thrombosis (mean 6 months, range 1 week to 5 years)
- Long term outcome assessed with duplex (average 21 months, range 2-69)

These underwent balloon dilatation
16 Chronically Occluded Veins

7 had had prior thrombolysis/angioplasty at outside institutions

Treated with Warfarin for 3 months following FRR

14 of these eventually recanalized within 6 months

A comprehensive review of Paget-Schroetter syndrome

Karl A. Ildef, MD, and Adam J. Doyle, MD, Rochester, NY

Venous thrombus on the postoperative site is particularly referred to as Paget-Schroetter syndrome, and it is observed in the area around the mid-thoracic spine. The condition is thought to be due to an idiopathic thrombosis, often in patients with a history of deep vein thrombosis. A strong correlation has been established between the condition and the thoracic outlet syndrome (TOS), which is a condition characterized by compression of the brachial plexus, subclavian vessels, and thoracic duct within the thoracic outlet. The thoracic outlet may be narrowed by any structure that compresses the structures within it. The syndrome is more common in younger males, particularly athletes with a history of repetitive upper extremity activity. The diagnosis of Paget-Schroetter syndrome can be challenging, and although there is no specific treatment, it may be necessary to step back and rigorously explore every aspect of the entity. (J Vasc Surg 2018;68:64-7.)
Numerous Controversies persist…

- Definitive answer to the timing of decompression – acute or delayed?
- The role of angioplasty vs observation for residual defects after decompression.
- The role of stents in the decompressed thoracic outlet.
- Duration of postoperative anticoagulation
- Natural history of the contralateral side
- Best treatment of the vein that cannot be opened with thrombolysis.

Conclusion:

- Venous TOS comprises up to 30% of UE DVT
- Prompt diagnosis should be made with attempt at thrombolysis preferably within 14 days followed by FRR
- Transaxillary 1st rib resection has excellent results with >90% vein patency in long term follow-up
- 3-6 months of warfarin post FRR
- Role of FRR in TOS with chronic occlusion (unsuccessful thrombolysis) : controversial...
- May be a role for postoperative venography to identify and treat residual stenosis (especially when treating more chronic cases of TOS)
- Surveillance venous duplex at 3 months, 6 months and yearly.