Venous Interventions

Upper Extremity DVT
- Primary Upper Extremity Venous Thrombosis
- Catheter Associated Thrombosis
- Venous Thoracic Outlet Syndrome

The Thoracic Outlet
Presentation

- Sudden onset
- Edema
- Pain, “Heaviness”, “Tightness”
- Cyanotic discoloration
- Equally affecting men and women
- Usually between 15-45 yo

Diagnosis

- Traditionally, with US
- Often the first step, even now
- MR or CTV can provide all the info of US as well as much else
- Catheter based venography remains the gold standard
- Provides the immediate ability to proceed with thrombolysis
Primary Upper Extremity Venous Thrombosis

- In fact, actually very rare
- Therapy is the same as for UE DVT of secondary cause (etiology is often understood only in retrospect)
- Heparinoids/Novel Oral Anticoagulants/Coumadin
- Thrombolysis


Axillary-subclavian venous occlusion: the morbidity of a nonlethal disease.

Gloviczki P, Kazmier FJ, Hollier LH.

To evaluate results of medical and surgical treatment of acute and chronic venous occlusion in the axillary-subclavian region, the clinical courses of 95 patients with axillary-subclavian venous occlusion were reviewed. Twenty-three patients had acute, subacute, or chronic thrombosis, and 72 had chronic or occlusive disease. There were 50 women and 45 men, with a mean age of 54 years. All patients had symptoms and signs of upper extremity venous obstruction, and 27 had symptoms of pulmonary embolism as well. Thirty-four patients had other complaints, including thoracic outlet syndrome, neck and shoulder pain, and Raynaud's phenomenon. The patients were treated initially with anticoagulation and, if necessary, with internal jugular vein ligation and transaxillary axillary vein ligation and Teflon graft implantation. When the patients had either intermittent or chronic venous obstruction, first rib resection was performed, and the operation was combined in 5 patients. The results were favorably evaluated in 58 patients and somewhat favorably evaluated in 37 patients. Of the patients, 4% had PE from the upper extremity DVT, 27% had life-limiting symptoms with mild activity, and 13% of those affected had symptoms at rest. Early intervention with anticoagulation and resolution of the underlying anatomic defect resolved the symptoms in 90% of those affected.

Gloviczki et al

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Post Thrombotic Syndrome

- Chronic edema
- Pain
- Cosmetic disfigurement
- Loss of function
- Potential compromise of the ability to remain employed

How Do We Prevent This?

- Anticoagulation
- Compression
- Thrombolysis
- Angioplasty
- Decompression of the SCV
- Open Venous Reconstruction

Prevention of PTS: Anticoagulation

- Immediate
  - Heparin
  - Lovenox
  - Usually NOT NOADS

- Long term, post intervention
  - 3-6 / 12 months
Prevention of PTS: Compression

- Less of an issue in the upper extremity vs lower extremity.
- Can be life changing for patients who develop PTS.
- Not normally indicated after uncomplicated, initial UE DVT.
- Can be used in the lower extremity soon after a DVT diagnosis is made.
- No custom-fitted garments until the initial edema is resolved.

Thrombolysis

- Indicated for virtually all young patients found to have SCV thrombosis.
- Best opportunity to avoid PTS.
- Uncovers the underlying cause.
- Provides rapid symptom relief.

Thrombolysis: Contraindications

- CVA within 90 days.
- AHI/intracranial neoplasms/recent neurosurgery.
- Recent head trauma or facial fractures.
- Non-CNS surgery within 3 weeks.
- Puncture of “non-compressible vessel” (relative).
- Active bleeding.
- Multiple relative, “minor” contraindications.
Thrombolysis:
IDEAL

Thrombolysis:
REAL

Thrombolysis:
REALLY REAL
Venous Stenting?

Addressing the Real Problem: Alteration of the SCV

- Extrinsic Scarring
- Intrinsic Synechiae
- First Rib Deformities
- Anomalous tendons/muscles
First Rib Resection

Diagnosis and treatment of effort-induced thrombosis of the axillary subclavian vein due to venous thoracic outlet syndrome.

...most frequently occurs in young, active, healthy patients.

...pathophysiology is repetitive compression injury of the SCV in the costoclavicular space, resulting in venous scarring, focal stenosis, and eventual thrombosis.

...After restoration of SCV patency, patients are maintained with anticoagulation and surgical therapy is usually planned within 4 to 6 weeks.

Surgical management of VTOS...accomplished via different protocols (paraclavicular, transaxillary, infraclavicular). The paraclavicular approach is emphasized in this review, because it affords the surgeon the ability to safely perform complete thoracic outlet decompression (complete anterior and middle scalenectomy, removal of the entire first rib, and resection of the subclavian muscle and costoclavicular ligaments), along with definitive management of the damaged SCV (external venolysis, intraoperative venography, and direct vein reconstruction, if needed, using patch angioplasty or bypass grafting), in one operative setting.

After surgical therapy, interval anticoagulation and a comprehensive physical therapy and rehabilitation program are important in achieving a return to full function. Current protocols on the basis of the paraclavicular surgical approach have thereby routinely provided patients with lasting symptomatic relief, freedom from indefinite anticoagulation, and the ability to return to unrestricted upper extremity activity.
**Paraclavicular Approach**

**Vein Patch**

**Venous UE Thrombosis—contemporary approach**

- Prompt identification
- Anticoagulation
- Thrombolysis
- Address ANY AND ALL underlying anatomic issues
Primary Thrombosis?

- As noted, quite rare
- Diagnosis of exclusion
- "Am I actually missing the problem here?"
- Additional testing (hypercoagulable syndrome?)
- Long term anticoagulation

Far more common than usually appreciated
- Studies describe an incidence of 2% to 75%
- Incidence depends upon type of catheter, time it's been in place, patient variables, US surveillance

Prophylaxis with anticoagulation controversial, not clearly demonstrated to help (and takes on the risk of anticoagulation)

A functioning, necessary indwelling catheter can be left in place while therapy is ongoing (although this does raise its own set of issues)

Treatment with 6 to 12 months of oral anticoagulation for the DVT is recommended

LOWER EXTREMITY DVT/STENOSIS

(ACUTE AND CHRONIC)
DVT

- A common problem...as many as 900,000 per year in the US alone
- Therapy has been less than satisfactory
- Between 20 and 50% of DVT patients will develop PTS
- Surely, there is a better answer?

DVT: Therapy

- Prompt Suspicion of the Diagnosis
- Ultrasound for Confirmation
- Anticoagulation
- Compression
- What else?

Post Thrombotic Syndrome
Venous Percutaneous Thrombolysis

- tPA and rheolytic catheters
  - AngioJet
  - Pneumbra
  - Others

- Overall, dramatic reduction in PTS but few randomized, prospective studies
- Risk reduced with rheolytic catheters, but nothing is risk-free

AngioJet

Thrombectomy device that delivers high-pressure jets to fragment and evacuate thrombus from the vessel.
Consequently......

- Used for young, otherwise healthy patients
- Iliac venous thrombosis
- Without contraindication to lytics
- Intracranial hemorrhage is the dreaded complication
- It is NOT the standard of care in the management of LE DVT
May-Thurner Syndrome

- Stenosis of the Left CIV due to compression by the R CIA
- Often have moderate edema, chronic "aching pain"
- May appear late in life or younger in active athletes
- Tip: Reflux in the left common femoral vein on US

Rouleaux Formation

- [Image: Rouleaux Formation]
May Thurner: Therapy

May Thurner Syndrome

Before
After


