Management of Acute DVT

Jonas Redmond, MD

Assistant Professor of Interventional Radiology
Department of Radiology
Hospital of the University of Pennsylvania
Penn Presbyterian Medical Center
Philadelphia, PA
No Financial Disclosures
Objectives

- Review patient selection for percutaneous endovascular DVT therapy
- Currently employed techniques for percutaneous thrombolysis/thrombectomy
- Role of IVC filters during therapy
Patient Selection

- Crucial in order to provide maximum benefit and limit complications

- Two general types of indications for CDT/PCDT
  - **Emergent/Urgent**
    - Limb salvage
    - Reduce risk of PE, renal failure, Budd-Chiari
    - Risk of PE increases with caval clot
  - **Preventative**
    - Reduce risk of Post-Thrombotic Syndrome (PTS)

Kaufman, JA et al. Surg Obes Relat Dis. 2006
Patient Selection – Iliofemoral DVT

- **50 – 60% risk of PTS with AC alone**
  - In part due to high degree of obstruction low recanalization rate (~20% at 5 years)

- **2x risk of recurrent venous thromboembolism compared to infrainguinal DVT**
  - Recurrent DVT further increases risk of PTS (2-6x)

- **CaVenT study (2012) showed significant:**
  - Improved venous patency at 6 months
  - Decrease in venous obstruction
  - Decrease in PTS

Sista AK et al. Radiology. 2015
Patient Selection – Infrainguinal DVT

- 5 Questions

1. What is the extent of DVT?
   - No clear benefit for CDT over AC for isolated calf vein DVT or DVT limited to popliteal vein
   - 80% femoropopliteal DVT recanalize at 6 months
   - 3% risk of major bleed, 0.4% risk of ICH

2. Severity and chronicity of symptoms?
   - Incidentally found asymptomatic DVT = rare PTS
   - Complete lysis unlikely if symptoms > 10-14 days old
   - Femoropopliteal vein DVT usually quickly improves with AC
     - Consider thrombolysis if persistent symptoms after 5 days of AC

Vedantham, S. Tech Vasc Interv Radiol. 2014
Patient Selection

5 Questions continued

3. Other risk factors for developing PTS?
   - Recurrent ipsilateral DVT
   - Femoropopliteal vein DVT with limited venous outflow
     - Occult iliac vein thrombus
     - Iliac vein stenosis/compression (eg May-Thurner)
     - Thrombosis of profunda
   - Loss of respiratory phasicity on US → CT/MRI

Vedantham, S. Tech Vasc Interv Radiol. 2014
Patient Selection

5 Questions continued

4. Does the patient have increased risk of bleeding or other complications?
   - Recent surgery, obstetrical delivery, GI bleed
   - DVT lysis is an elective procedure

5. What was the functional status of the patient before DVT and how motivated is the patient now?
   - Reasonable life span
   - Near normal ambulatory function
   - Balanced discussion of risks and benefits

Vedantham, S. Tech Vasc Interv Radiol. 2014
Decision Model to Perform CDT Based on Clinical Presentation and Risk of Bleeding

**Radiology:** Volume 276: Number 1; July 2015

<table>
<thead>
<tr>
<th>Clinical Scenario</th>
<th>Bleeding Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Acute limb threat</td>
<td>Yes</td>
</tr>
<tr>
<td>Extensive IVC thrombosis</td>
<td>Yes</td>
</tr>
<tr>
<td>Progression of symptoms or anatomic extent despite anticoagulation</td>
<td>Yes</td>
</tr>
<tr>
<td>Iliofemoral DVT to prevent PTS</td>
<td>Yes</td>
</tr>
<tr>
<td>Femoropopliteal DVT to prevent PTS</td>
<td>Usually no</td>
</tr>
</tbody>
</table>

Note.—Adapted, with permission, from reference 109.
Techniques

- **Catheter Directed Thrombolysis (CDT)**
  - No device used
  - Costly
    - Prolonged hospital stay
    - ICU bed
  - SIR and AHA support use of subtherapeutic UFH during thrombolysis

- **Ultrasound-assisted CDT**
  - EKOS
  - No real data to support use
  - Pending results of Catheter vs. Anticoagulation (CAVA) trial – enrollment ongoing

References:
Baker et al. JVIR. 2012
Sista AK et al. Radiology. 2015
Techniques - Pharmacomechanical CDT (PCDT)

- **Infusion first**
  - CDT to reduce thrombus burden
  - Useful when thrombus causes low inflow state
  - Mechanical thrombectomy/thrombolysis to clean up

- **Power pulse spray** (AngioJet, Boston Scientific)
  - Can be single session
  - Can “kick start” lysis aka “Buzz and Lyse”
  - 10-25mg tPA in 500 mL saline

- Initial study results promising
- Shorter hospital stay (less expensive, happier patients)
- 40-50% reduction in lytic dose (?) Fewer bleeding complications

Amin VB et al. Tech Vasc Interv Radiol. 2014
Vedantham S et al. JVIR. 2004
ATTRACT Trial

- Target enrollment completed
- Results by early 2017
- PCDT vs. AC
- 692 patients
- Randomization stratification allows stratification for iliofemoral DVT
- Does PCDT prevent PTS and improve quality of life
IVC filters

- Not routinely used during thrombolysis
  - No significant increased risk of PE compared to AC (1.3%)
  - 2x risk of recurrent DVT at 2 years
  - Inherent risks of filter placement

Mewissen MW et al. Radiology. 1999
IVC Filters

- Not ALWAYS a bad idea
- Single session PCDT
  - Bush RL. J Vasc Surg. 2004
    - 23 limbs, 20 patients
    - 7 patients with IVC filters. 2 (28.5%) had trapped clot on completion venography
- FILTER-PEVI trial
  - 141 patients randomized to receive IVC filter or not prior to percutaneous endovenous intervention
    - 1 symptomatic PE in filter group, 8 in control group
    - No mortality
    - No increased risk of PE or recurrent DVT in filter group at 15 months
IVC Filters

- Consider use during PCDT
- Especially if single session and patients with:
  - Iliocaval thrombus
  - Low cardiopulmonary reserve
Summary

- Patient selection is paramount for CDT/PCDT
  - The Big 3: Phlegmasia, Iliocaval thrombus, and Iliofemoral DVT
  - Selected patients with femoropopliteal DVT
- CDT and PCDT are both viable options
- Routine IVC filter placement is not recommended
Thank You