Surveillance After Venous Stenting: Venography And Duplex Ultrasound

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Disclosures
Dr. Ouriel is an employee of and holds equity in Syntactx, a contract research organization that performs research services for the following companies involved in the diagnosis and/or treatment of venous disease:
Medtronic, Gore, Cook, Veniti, Philips, InterVene, Ekos, Inari

Imaging the Iliofemoral Venous Segment

Imaging Options for the Iliofemoral Segment
1. Venography
2. Duplex Ultrasound
3. IVUS
4. CTV
5. MRV

Venography or Duplex for Surveillance

Venography
- Needle stick
- Some radiation/contrast
- In most cases, not done in the office setting

Duplex ultrasound
- Noninvasive
- No radiation/contrast
- Done in almost every clinic

Duplex Problem: No Validated Criteria Post-Stenting

Duplex Post-Stenting: The World’s Literature

<table>
<thead>
<tr>
<th>Year</th>
<th>Reference</th>
<th>N</th>
<th>Indication</th>
<th>DUS technique</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>[22]</td>
<td>15</td>
<td>Central arm vein obstruction in hemodialysis patients</td>
<td>NA</td>
<td>Venography was performed when symptoms and DUS suggested stenosis</td>
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<tr>
<td>1999</td>
<td>[23]</td>
<td>12</td>
<td>Chronic post-thrombotic pelvic venous obstruction</td>
<td>NA</td>
<td>DUS revealed one occlusion within a week while the other stents remained patent over a mean of 15 months</td>
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<tr>
<td>2000</td>
<td>[24]</td>
<td>10</td>
<td>May Thurner syndrome</td>
<td>NA</td>
<td>Female patients</td>
</tr>
<tr>
<td>2010</td>
<td>[25]</td>
<td>34</td>
<td>Chronic occluded caval and iliofemoral venous segments</td>
<td>Examiners recorded flow and morphological changes suggesting stenosis (&gt;50% diameter reduction) with Doppler and spectral analysis. Eventually, in 13 patients in whom symptoms recurred, both DUS and venography were utilized. Unfortunately, concordance between these modalities was not reported.</td>
<td></td>
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<tr>
<td>2012</td>
<td>[17]</td>
<td>90</td>
<td>Acute iliofemoral deep vein thrombosis</td>
<td>Gray-scale ultrasound was used for detection of post-thrombotic iliofemoral wall thickening and intraluminal hyperechoic structures. Compression ultrasound assessed compressibility of the femoral vein. Doppler ultrasound was used to evaluate iliofemoral venous flow and femoral venous insufficiency. Stents were placed in 17% of patients</td>
<td></td>
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<tr>
<td>2014</td>
<td>[26]</td>
<td>26</td>
<td>Manual aspiration thrombectomy followed by stenting for iliac vein compression syndrome with secondary acute isolated iliofemoral deep vein thrombosis</td>
<td>NA</td>
<td></td>
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<tr>
<td>2014</td>
<td>[27]</td>
<td>8</td>
<td>Venous compression (May Thurner Syndrome)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>[28]</td>
<td>75</td>
<td>35 cases of iliac vein compression syndrome and 40 cases of unilateral chronic obstruction in post-thrombotic syndrome</td>
<td>B-mode reduction of 50% lumen diameter</td>
<td>Study evaluated a single stent: sinus venous stent (OptiMed GmbH, Ettlingen, Germany)</td>
</tr>
<tr>
<td>2015</td>
<td>[29]</td>
<td>18</td>
<td>Ultrasound accelerated catheter directed thrombolysis for in-stent thrombosis of venous stents</td>
<td>Apparent thrombosis and/or lack of flow in the stented tract</td>
<td></td>
</tr>
</tbody>
</table>
Duplex for Surveillance: Still the Best (Only) Test

Absent Good Data: Use Common Sense

- Venography is impractical in every stented patient.
- Venography can lead to unnecessary reinterventions (the "oculo-stenotic reflex").
- MRV and CTV are expensive and impractical for patients, rendering them unsuitable for surveillance.
- Common Sense: Duplex ultrasound is the most efficient, least invasive, and lowest cost routine surveillance test after iliofemoral venous stenting.

Absent Data: Duplex is Best

It is a thousand times better to have common sense without education than to have education without common sense. –Robert G. Ingersoll