How to measure iliac vein stenosis?

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Disclosures

• Stock in Veniti inc.
• US patent: IVUS diagnostics in CVD
• Stent usage in iliac-femoral veins is currently off label.

Arterial stenosis criteria not appropriate for venous stenoses

- Critical element in arterial stenosis is downstream perfusion.
- Critical element in veins is upstream pressure (Peripheral venous pressure) which is related to symptoms.

Peripheral pressure is elevated if outlet area is small

IVUS planimetry is crucial to estimate iliac stenosis. This is based on anatomic minimal size required to keep peripheral pressure low.

- % stenosis not appropriate.
- Minimal Normal Lumen Sizes
  - CIV: 16 mm Diameter; 200 sq mm Area
  - EIV: 14 mm Diameter; 150 sq mm Area
  - CFV: 12 mm Diameter; 125 sq mm Area

The basis of symptoms in CVD is elevation of peripheral venous pressure.
ROKITANSKI STENOSIS: Long diffuse lesion, often with no focal cues. Common in the iliacs. Not apparent in venograms. IVUS definitive. This means stenosis% cannot be calculated based on comparison with adjacent segment as in arterial stenosis.

Normal venogram but IVUS stenosis (PTS). Note trabaculae and perivenous fibrosis on IVUS but not seen on venogram. IVUS area 72 sq mm, about 65% stenosis.

Iliac Venous Stenting

TECHNIQUE

- This means large sized stents approaching normal anatomy of iliac veins should be used, generally 16 mm for CIV, 14 mm for EIV and 12 mm for CFV. We recommend 18 mm stents but restrict dilatation to above diameters.
- Slight oversizing compensates for possible ISR and allows over dilatation later if required.

Evils of Under-stenting

- Normal CIV: diameter 16 mm = area 200 sq mm ($\pi r^2$).
- A 14 mm stent represents 24% stenosis
- A 12 mm stent represents 34% stenosis
- A 10 mm stent represents 60% stenosis
- These will be much worse if the stent develops some degree of ISR- up to 25% is common.
- As little as 20% area stenosis have been shown to cause peripheral venous hypertension in experimental systems.

The area method can be used with duplex and MRV: calculate area from diameter.

<table>
<thead>
<tr>
<th>Diagnostic accuracy of Duplex area method and MRV compared to IVUS in Native Limbs (n=36)</th>
<th>False Positives</th>
<th>False Negatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUS v. IVUS</td>
<td>(7/36) 19%</td>
<td>(1/36) 3%</td>
</tr>
<tr>
<td>MRV v. IVUS</td>
<td>(9/36) 25%</td>
<td>(1/36) 3%</td>
</tr>
</tbody>
</table>

**Fischer exact analysis shows no significant difference between MRV and DUS in Native limbs (P=1.000)**