Reflux Exam in the Standing Position: Why is This Still Controversial?

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I Have No Disclosures Relevant To This Presentation

What Does the IAC Say?
Standards & Guidelines for Vascular Testing Accreditation 8/15

Standard 4.4 B
Appropriate technique must be used for the evaluation of the peripheral venous system, stents, arteriovenous fistula (AVF) / dialysis access grafts to assess for the presence of any abnormalities and to document their severity, location, extent, and where possible, their etiology.

Standard 4.4.1 B
Elements of technique include, but are not limited to:

Standard 4.4.1.2 B
Proper patient position; For assessing reflux standing, sitting, or reverse Trendelenburg (at least 15 degrees) must be used to maintain lower extremity dependency.

Does This Make Any Sense??

Mechanism of Valve Closure
van Bemmelen et al, Arch Surg 1990

Standing Cuff Deflation
van Bemmelen et al, J Vasc Surg

30 nl limbs examined with standing cuff method
95% of normal valves close within < 0.5 sec

Mechanism of Valve Closure
van Bemmelen et al, Arch Surg 1990

Standing vs Supine Reflux
Markel et al; Arch Surg 1994

Standing vs supine maneuvers (N ~ 167)
False negatives – Absence of dependent venous dilation
False positives – Failure to generate adequate reverse velocity
The INVEST Study
Lurie F, J Vasc Surg 2012
- Duplex U/S in 17 volunteers and 57 CVD patients
- Repeatability & reproducibility
- Limits of agreement
  - Time of day (morning vs afternoon)
  - Position (standing vs supine)
- Reflux initiation (manual vs cuff compression)
- Mean reflux times shorter (0.23 sec) in standing position
  - Supine 0.82 ± 0.81 sec
  - Standing 0.59 ± 0.65 sec
- Lower precision = higher reproducibility

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Patient Position</th>
<th>Morning</th>
<th>Afternoon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Supine</td>
<td>0.71</td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td>Standing</td>
<td>0.43*</td>
<td>0.88*</td>
</tr>
</tbody>
</table>

*p < .05

Best Reproducibility Standing in the Morning

Standing vs Supine Reflux
Labropoulous N, J Vasc Surg 2003
- Reflux times measured in 10 patients
  - Standing with cuff compression
  - Supine with cuff compression
- False Negative
- False Positive

Conclusions
- Theoretical support for standing reflux assessment
  - Physiological (Venous htn is an upright phenomenon)
  - Generation of adequate transvalvular gradient
  - Adequate venodilation for coaptation of valve cusps
- The data
  - Supine position produces both false + and –
  - Less reproducibility in supine positions
  - IAC standards mandating upright testing are in progress