Stents or Stent-Grafts for Central Venous Disease

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Disclosures

- Consultant: Proteon Therapeutics
- Off-label use of stents and stent-grafts
Indications

- outflow patency - edema of extremity, head...
- adjunct in central vein thrombectomy
- central vein injury (rupture, etc.)

Symptomatic and failed angioplasty

Do not treat the angiogram!
Success of Non-covered Stents in Central Vein Disease

<table>
<thead>
<tr>
<th># of pat</th>
<th>primary patency @ 3months</th>
<th>primary patency @ 12months</th>
<th>type of stent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vogel (J Vasc Interv Radiol 2004)</td>
<td>15</td>
<td>67%</td>
<td>SMART</td>
</tr>
<tr>
<td>Rajan (Cardiovasc Intervent Radiol 2007)</td>
<td>6</td>
<td>66%</td>
<td>Nitinol</td>
</tr>
</tbody>
</table>

- Overall, 1-year patency rates after non-covered stents (self-expanding, nitinol) in 50-75% range, decreasing thereafter
- Angioplasty alone typically 1 year patency rates << 50%

Lack of randomized controlled studies
## Success of Covered Stents in Central Vein Disease

<table>
<thead>
<tr>
<th>Study</th>
<th># of pat</th>
<th>Primary patency @ 3months</th>
<th>Primary patency @ 12months</th>
<th>Type of stent graft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kundu (Cardiovasc Intervent Radiol 2011)</td>
<td>14</td>
<td>100%</td>
<td>100% (9 months)</td>
<td>Fluency Plus</td>
</tr>
<tr>
<td>Anaya-Ayala (J Vasc Surg 2011)</td>
<td>25</td>
<td>56%</td>
<td></td>
<td>Viabahn</td>
</tr>
<tr>
<td>Jones (J Vasc Interv Radiol 2011)</td>
<td>30</td>
<td>67%</td>
<td></td>
<td>Viabahn</td>
</tr>
<tr>
<td>Santini (J Vasc Access 2012)</td>
<td>20</td>
<td>94.7%</td>
<td></td>
<td>Viabahn</td>
</tr>
<tr>
<td>Verstandig (J Vasc Interv Radiol 2013)</td>
<td>52</td>
<td>50%</td>
<td></td>
<td>Fluency Plus Viabahn</td>
</tr>
</tbody>
</table>
Consequences of stent graft insertion

- occlusion of contralateral or ipsilateral veins by stent graft with loss of future options
- injury of vein by straightening of stent
How stiff are stents?

Axillary vein

Venous needle insertion site

Venous anastomosis

Axillary vein
Left internal jugular vein tunneled catheter

Top View

Lateral View

SVC

BCV

IJ
Consequences of stent graft insertion

- occlusion of contralateral or ipsilateral veins by stent graft with loss of future options
- injury of vein by straightening of stent
- what is consequence of “fixing” thrombus in occluded segment (infection, restenosis...)
- sizing of stents/stent grafts (Wallstent 16, nitinol 14mm, Viabahn 13mm, Fluency Plus 13.5)
Left upper arm transposed brachial-basilic autogenous access

Total stenosis at BCV-SVC junction
Left upper arm transposed brachial-basilic autogenous access

Limited angioplasty at BCV-SVC junction
Left upper arm transposed brachial-basilic autogenous access

Limited angioplasty at BCV-SVC junction

subclavian vein

brachiocephalic vein
Left upper arm transposed brachial-basilic autogenous access

Two years later

High grade re-stenosis at BCV-SVC junction
Are all symptomatic central vein stenoses the same?

- Cardiac device wires
- Tunneled catheters
- Balloon-angioplasty injury
- Direct access injury (subclavian vein)
- External compression by other vascular structures
- ...
BWH central vein stent cohort

- 2008-2014 observational, by protocol:
  need clinical symptoms
  non-covered stent if previous AP interval < 3 months or complete recoil
  total occlusion may receive non-covered stent immediately
  interval follow-up, 3 months, then longer
  covered stent if re-angioplasty interval < 3 months or total occlusion at time of follow-up

- 52 patients, 24 non-covered plus covered, 28 non-covered alone

- SMART and Viabahn stents and stent grafts (off label use)
<table>
<thead>
<tr>
<th></th>
<th>non-covered plus covered (n=24)</th>
<th>non-covered alone (n=28)</th>
<th>comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>total occlusion</td>
<td>10</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>primary patency for non-covered stent</td>
<td></td>
<td>12.3 months 95% at 1 year</td>
<td></td>
</tr>
<tr>
<td>average angioplasties prior to stent and days between procedures</td>
<td>2.7 AP 108 days</td>
<td>3 AP 143 days</td>
<td></td>
</tr>
<tr>
<td>AP at site after non-covered stent and days between procedures</td>
<td>2.75 AP 208 days</td>
<td>8 angioplasties in 6 patients 22 patient no AP</td>
<td>1 died before Stent graft insertion</td>
</tr>
<tr>
<td>AP at site after stent graft</td>
<td>none one early total occlusion</td>
<td></td>
<td>2 AP of immediate stent</td>
</tr>
</tbody>
</table>
Intra-procedural interval length

non-covered stent alone group

stent graft after non-covered stent group

year of non-covered stent placement
• Stent AND Stent Graft can work well

• We need to understand different central vein stenosis to better fit treatment options

• Less is sometimes more...