Venous Stenting:
How does the optimal device look like and does it already exist?

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Currently used stents

- Arterial design
  - sizes
  - lengths
  - Low radial force
  - Prevent internal hyperplasia
    - Drug eluting
- Examples:
  - Wall stent
  - Sinus XL stent
Requirements for stents per segment

- The vein geometry should dictate the shape of the stent and not VV !!
  - Flexibility
- The stent must be able to treat the underlying pathology
  - Radial Force
- Location dependent:
  - IVC: High radial force, low flexibility, large diameter.
  - CIV, EIV and CFV: High radial force, high flexibility, large diameters
Shortcomings of stents today

- Compression of stent (radial force to low)
- Kinking of stent (high rigidity)
- Tapering
- Stent rigidity
  - Bamboo stick effect
Shortcomings of stents today

- Compression of stent (radial force to low)
- Kinking of stent (high rigidity)
- Tapering
- Stent rigidity
  - Bamboo stick effect
Shortcomings of stents today

- Compression of stent (radial force to low)
- Kinking of stent (high rigidity)
- Tapering (especially Wallstent)
- Stent rigidity
  - Bamboo stick effect
Shortcomings of stents today

- Compression of stent (radial force to low)
- Kinking of stent (high rigidity)
- Tapering
- Stent rigidity
  - “Bamboo stick effect”
  - Visible after weeks due to straightening!!
Shortcomings of stents today

Visible after weeks due to **straightening**!!
Obstruction due to stent sticking out into the lumen $\rightarrow$ alignment!!
Good alignment $\rightarrow$ better long term patency $\pm$ anticoagulation
Movements in pelvis/groin:

supine

sitting
# New venous Stents

<table>
<thead>
<tr>
<th>Type</th>
<th>Radial force</th>
<th>flexibility</th>
<th>placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zilver Vena</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Veniti</td>
<td>++</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Sinus Venous</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Sinus XL flex</td>
<td>++</td>
<td>+</td>
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</tr>
</tbody>
</table>

![Zilver Vena](image1.png)  
![Veniti](image2.png)  
![Sinus Venous](image3.png)
New venous Stents

• Oblique closed cell (6 cm length)
  • Flair it
  • Reposition it
  • Deploy
  • Extention with Sinus Venous for the iliofemoral tract
New venous Stents

Flexibility ++

Radial force ++
New Sinus-Venous stent
New Sinus-Venous stent \((N=31)\) vs Old design stents \((n=66)\): In PTS procedures

Arterial stents vs Sinus Venous for PTS

- New secondary
- Old secondary
- New Assited primary
- New primary
- Old assisted primary
- Old primary

\[ \approx + 10\% \]

\[ P < 0.05 \]
# New Sinus-Venous stent vs Old design stents:
In PTS procedures

## Complications first year

<table>
<thead>
<tr>
<th></th>
<th>Old design stent</th>
<th>%</th>
<th>Sinus Venous</th>
<th>%</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>66</td>
<td>100</td>
<td>31</td>
<td>100</td>
<td></td>
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<tr>
<td>Reocclusion</td>
<td>16</td>
<td>24</td>
<td>3</td>
<td>10</td>
<td>&lt; 0,05</td>
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<tr>
<td>Kinking</td>
<td>7</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>&lt; 0,05</td>
</tr>
<tr>
<td>Fracture</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>&lt; 0,05</td>
</tr>
<tr>
<td>Tapering</td>
<td>19</td>
<td>29</td>
<td>4</td>
<td>13</td>
<td>&lt; 0,05</td>
</tr>
<tr>
<td>Residual compression</td>
<td>7</td>
<td>11</td>
<td>3</td>
<td>10</td>
<td>NS</td>
</tr>
<tr>
<td>Mild stenosis</td>
<td>17</td>
<td>26</td>
<td>9</td>
<td>29</td>
<td>NS</td>
</tr>
</tbody>
</table>

**Higher flexibility**
**Higher radial force**
**Less reinterventions**
# Comparison of new venous Stents

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## Stent Performance Summary

<table>
<thead>
<tr>
<th>Stent</th>
<th>Positioning failure</th>
<th>Surface area (CIV)</th>
<th>Suboptimal apposition*</th>
<th>Straightening</th>
<th>Kinking</th>
<th>Fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td>XL</td>
<td>1/10</td>
<td>1.1 cm²</td>
<td>6/10</td>
<td>7/10</td>
<td>7/10</td>
<td>0/10</td>
</tr>
<tr>
<td>SV</td>
<td>4/10</td>
<td>1.2 cm²</td>
<td>0/10</td>
<td>0/10</td>
<td>0/10</td>
<td>0/10</td>
</tr>
<tr>
<td>ZV</td>
<td>1/10</td>
<td>0.8 cm²</td>
<td>0/10</td>
<td>0/10</td>
<td>0/10</td>
<td>0/10</td>
</tr>
<tr>
<td>VV</td>
<td>0/10</td>
<td>1.4 cm²</td>
<td>5/10</td>
<td>4/10</td>
<td>3/10</td>
<td>0/10</td>
</tr>
</tbody>
</table>

European Venous Centre; Aachen-Maastricht
Reconstruction and stenting in deep vein pathology
10-12 September 2015

Thrombolysis and stenting in deep vein thrombosis
26-28 November 2015

Duplex ultrasound in venous disease
10-12 December 2015

Info:

www.evtcentre.com
New dedicated venous stent are available and should be used!

- Sinus-Venous Stent:
  - No stent related reinterventions!!
  - better primary and secondary patency due to:
    - High flexibility with good alignment !
    - High radial force
  - Combined with oblique stent better positioning?!
- Zilver Vena
- Veniti
- More will come!!
New venous Stents

Flexibility ++

Radial force ++

European Venous Centre; Aachen-Maastricht