Complex iliocaval reconstruction with self-expending nitinol stents

Tim Sebastian
Department of Angiology, UniversitätsSpital Zürich, Switzerland
Clinical Director: Prof. Nils Kucher
Disclosure

Speaker name:
Tim Sebastian

I have the following potential conflicts of interest to report:

☐ Consulting
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☐ I do not have any potential conflict of interest
Why dedicated venous stents?
Expectations

Precise deployment
Less foreshortening

Flexibility
Optimal accommodation to venous anatomy

Equally distributed radial force
Throughout stent length

Wall coverage
Protecting stent lumen from fibrotic tissue

Durability
At critical sites
Expectations

Precise deployment
Less foreshortening

Flexibility
Optimal accommodation to venous anatomy

Equally distributed radial force
Throughout stent length

Wall coverage
Protecting stent lumen from fibrotic tissue

Durability
At critical sites
Swiss Venous Stent Registry

Prospective, on-going register including patients who received venous stents in Switzerland since 2011

From 274 patients in the registry, 62 patients received caval or ilio-caval stent interventions with nitinol stents (212 excluded with ilio-femoral stents only)

Stents used:
Sinus XL, Sinus XL Flex, Sinus Superflex (Optimed, Ettlingen, Germany)
Zilver vena (Cook, Bloomington, USA)

Sebastian T, Dopheide JF, Engelberger RP, Spirk D, Kucher N.
Outcomes of endovascular reconstruction of the inferior vena cava with self-expanding nitinol stents.
Baseline characteristics

Mean age 46 ± 18 years, 14 women

Index Diagnosis
33 post-thrombotic syndrome (53%)
17 acute thrombosis (27%)
12 non-thrombotic IVC compression (19%)

22 external IVC compression
16 cancer related, 3 retroperitoneal fibrosis, 1 echinococcosis, 1 abdominal aortic aneurysm, 1 vertebral screws

Sebastian T, Dopheide JF, Engelberger RP, Spirk D, Kucher N.
# Procedural data

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical success</td>
<td>61</td>
<td>98%</td>
</tr>
<tr>
<td>CDT or PMT</td>
<td>21</td>
<td>34%</td>
</tr>
<tr>
<td>Iliac kissing stents</td>
<td>52</td>
<td>84%</td>
</tr>
<tr>
<td>IVC Filters</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Mean number of stents  4.5 ± 1.9 stents  
Mean stent length  45 ± 20 cm

## Proximal landing zone

<table>
<thead>
<tr>
<th>Location</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right atrium</td>
<td>7</td>
<td>11%</td>
</tr>
<tr>
<td>Suprarenal</td>
<td>42</td>
<td>68%</td>
</tr>
<tr>
<td>Infrarenal</td>
<td>13</td>
<td>21%</td>
</tr>
</tbody>
</table>

Sebastian T, Dopheide JF, Engelberger RP, Spirk D, Kucher N.  
*Outcomes of endovascular reconstruction of the inferior vena cava with self-expanding nitinol stents.*  
Procedural data

Type I: Single-segment stenosis: 4 (6%)

Type II: Multi-segment stenosis: 14 (23%)

Type III: Single-segment occlusion: 2 (3%)

Type IV: Multi-segment occlusion: 42 (68%)

Sebastian T, Dopheide JF, Engelberger RP, Spirk D, Kucher N.
Outcomes of endovascular reconstruction of the inferior vena cava with self-expanding nitinol stents.
Mean follow up 21 months, death 4 (underlying malignant disease)
Clinical Outcome

Ulcer healing: 8/8 (100%)

Development of new ulcers: 0%

Freedom of symptoms\(^1\): 43%
Significant clinical improvement\(^1\): 48%

\(^1\): subjective symptom score as suggested by Bozkaya et al.

Decrease in Villalta score: 11.8 to 3.5

### Clinical Outcome

<table>
<thead>
<tr>
<th>On-going anticoagulation therapy</th>
<th>56 (92%) patients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DOACs</strong></td>
<td>40 (66%) patients</td>
</tr>
<tr>
<td><strong>Vitamin K antagonists</strong></td>
<td>14 (23%) patients</td>
</tr>
<tr>
<td><strong>LMWH</strong></td>
<td>2 (3%) patients</td>
</tr>
<tr>
<td>+ <strong>P2Y12 antagonists</strong></td>
<td>7 (11%) patients</td>
</tr>
</tbody>
</table>

Sebastian T, Dopheide JF, Engelberger RP, Spirk D, Kucher N.  
*Outcomes of endovascular reconstruction of the inferior vena cava with self-expanding nitinol stents.*  
Predictors of patency loss

Patients with a history of deep vein thrombosis and/or postthrombotic leg inflow veins are at high risk for primary patency loss.

Stenting below the inguinal ligament was not associated with loss of primary patency in our cohort.

## What’s in the literature

Selection of recent publications on ilio-caval stent reconstruction

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Follow Up (months)</th>
<th>Acute Cases</th>
<th>Technical Success</th>
<th>Main Stent</th>
<th>Primary Patency</th>
<th>Secondary Patency</th>
<th>Ulcer Healing</th>
<th>Anti-coagulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>De Graaf 2015</td>
<td>40</td>
<td>15</td>
<td>15%</td>
<td>100%</td>
<td>Nitinol</td>
<td>70%</td>
<td>78%</td>
<td>N/A</td>
<td>VKA (min 6m)</td>
</tr>
<tr>
<td>Murphy 2016</td>
<td>71</td>
<td>48</td>
<td>0%</td>
<td>85%</td>
<td>Wallstent Z-Stent</td>
<td>52%</td>
<td>93%</td>
<td>78%</td>
<td>VKA ASS (life)</td>
</tr>
<tr>
<td>Chick 2017</td>
<td>120</td>
<td>24</td>
<td>48%</td>
<td>100%</td>
<td>Wallstent</td>
<td>87%</td>
<td>94%</td>
<td>88%</td>
<td>VKA/DOAC (min 6m) Clop (2m) ASS (life)</td>
</tr>
<tr>
<td>Erben 2018</td>
<td>66</td>
<td>42</td>
<td>2%</td>
<td>90%</td>
<td>Wallstent Z-Stent</td>
<td>78%</td>
<td>91%</td>
<td>100%</td>
<td>OAC (life)</td>
</tr>
<tr>
<td>Sebastian 2018</td>
<td>62</td>
<td>21</td>
<td>27%</td>
<td>98%</td>
<td>Nitinol</td>
<td>57%</td>
<td>87%</td>
<td>100%</td>
<td>VKA / DOACs (life)</td>
</tr>
</tbody>
</table>

IVC filter-associated: Murphy (54%), Chick (100%), Erben (38%)
Conclusion

**Primary patency rate** beyond 2 years for nitinol stents is >55%

**Secondary interventions** are often necessary to maintain patency, most likely due to impaired venous stent inflow

**Secondary patency rates** can be as high as 90%

Role of **anticoagulation / anti-platelet** therapy is unclear

**Data for nitinol stents is similar** compared to Wallstents
Thank you for your attention.