Complexities of venous stenting

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Conflict of Interest - Disclosure

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

<table>
<thead>
<tr>
<th>Affiliation/Financial Relationship</th>
<th>Company</th>
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<tbody>
<tr>
<td>1. Honoraria for lectures:</td>
<td>CR Bard, Veniti, AB Medica, Volcano, Optimed GmbH, Straub Medical, Terumo, Biotronik, Veryan</td>
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<td>2. Honoraria for advisory board</td>
<td>Veniti, Optimed GmbH, Straub Medical, Biotronik, Veryan, Boston Scientific</td>
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<td>activities:</td>
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<td>3. Participation in clinical</td>
<td>Biotronik, CR Bard, Veryan, Straub Medical, Veniti, TVA Medical, Boston Scientific, LimFlow, Terumo</td>
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<td>trials:</td>
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<td>4. Research funding:</td>
<td>Biotronik, Boston Scientific, Veryan, Veniti, AB Medica</td>
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Complex things should be made easy
43 y, female, C4
Unless the collateral(s) are nearly the same size as original iliac vein, it is impossible to normalize venous pressure.
Patient Selection for Successful Venous Stenting

- Clinical severity of the disease
  - Don’t treat the lesion, treat the patient

- Findings on Investigations

- Treatment Considerations
  - Can the patient be stented?
    - Assess landing zones
    - Sufficient inflow to the CFV?
    - Need for endophlebectomy?
Plan your case

6 months FU
Unfortunately discussing stent patency is more complex.
Venous Stent Options (CE)

- Boston Wallstent
- Optimed
- Cook Zilver Vena
- VIVO (EU) Trial presented
- Veniti Vici
- VIRTUS Trial LINC 2019
- Optimed Sinus obliquus
- Bard Venovo
- VERNACULAR Trial Presented
- Medtronic ABRE
- ABRE Clinical Study ongoing
- Blueflow IP medical
- PMS ongoing
...there is not a perfect venous stent for the whole system..
Figure A: Radial Resistive Force

Figure B: Chronic Outward Force

- Zilver
- Wallstent
- Vicr
- Sinus Venous
- Sinus XL FLEX
- Sinus Obliquus
- Sinus Obliquus open cell
- Sinus Obliquus closed cell
- Wallstent (fixed)
- Venovo

N/cm: Newtons per centimeter
ASPECT RATIO CORRELATES WITH PATENCY

Aspect ratio 1.2

Aspect ratio 1.8

Placement of closed-cell designed venous stents in a mixed cohort of patients with chronic venous outflow obstructions - short-term safety, patency, and clinical outcomes.
Lichtenberg M, Breuckmann F, Stahlhoff WF, Neglén P, Rick G.
Aspect ratio of 2 impacts patency rate
Low (IN)FLOW = Low Pressure = Low Velocity
Bernoulli equation

\[ A_1 \vec{v}_1 \quad A_2 \vec{v}_2 \]

\[ A_1 \vec{v}_1 \quad A_2 \vec{v}_2 \]

Velocity

Area Flow

Rethrombosis

Area Flow
Thrombectomy of profunda vein
Funnel principle

16 mm

14 mm

22 cm/sec

Low velocity = Rethrombosis
Complex questions are......

- What is appropriate inflow?
- What is the threshold for endophlebectomy/AV fistula?
- If inflow is bad,... do we need to implant smaller stents?
VENOUS INSTENT RESTENOSIS STUDY
To avoid complexities...accept conditions

- Check indication
- Plan your case
- Use correct stent for aspect ratio 1
- Check for in- and outflow
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Course Directors

Dr. med. Michael Lichtenberg
Prof. Dr. med. Giovanni Torsello
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„CLI congress is an interdisciplinary live course which provides an update on endovascular and operative therapy strategies for the most challenging vascular disease.“

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