Analysis of venous intimal reaction after stent implantation: Does stent porosity matter?

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Disclosure

I have the following potential conflicts of interest to report:

- Receipt of grants/research support
  - Medtronic, BD BARD, Cook, Ab medica, Bentley, Optimed, Boston Scientific

- Receipt of honoraria and travel support
  - Medtronic, BD BARD, Cook, Ab medica, Bentley, Optimed, Boston Scientific
Objectives

- Effect of porosity on venous wall
  - Initial injury
  - Inflammation
  - Connective tissue proliferation

- Effect of porosity on neo-endothelialization of the stent
  - Time to complete endothelialization
  - Quality of endothelium

- Patency of jailed tributaries
Project Overview

- **Sponsorship:**

- **Timeline:**
  - Experiment: Sept 2017
  - Analysis: March 2018
  - Analysis: Sept 2018

- **Study samples**
  - Female Rhone Sheep
  - Mean age 3 y/o
  - Mean weight 63 kg (55.2-70.0)

- **Groups:**
  - G1 (n=3) FU 6 W
  - G2 (n=3) FU 12 W
  - G3 (n=3+1) FU 24 W
• Target vein: IVC (Ø16mm)

• Access site: right IJV

• Technique of intervention similar to real patient

• 3 segmented nitinol self expandable stents with different lengths of skipped segments (based on Sinus Venous)
  • 2mm, 5mm, 8mm

Ø 18 mm
Procedure

Stent with 8 mm skip

8 mm skip

5 mm skip

2 mm skip

10 mm distance

2 mm gaps

5 mm gaps

8 mm gaps

6 weeks after implantation

3 months after implantation

6 months after implantation
Anticoagulation

- Enoxaparin 3mg / kg bid s.c.
- Starting 3 days before the procedure
# Follow up

<table>
<thead>
<tr>
<th>Group</th>
<th>Sacrifice</th>
<th>Blood test</th>
<th>DUS</th>
<th>CTV</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1, n=3</td>
<td>6w</td>
<td>6w</td>
<td>After: 3d, 4w, 6w</td>
<td>6w</td>
</tr>
<tr>
<td>G2, n=3</td>
<td>3m</td>
<td>3m</td>
<td>After: 3d, 4w, 6w, 3m</td>
<td>3m</td>
</tr>
<tr>
<td>G3, n=4</td>
<td>6m</td>
<td>6m</td>
<td>After: 3d, 4w, 6w, 3m, 6m</td>
<td>6m</td>
</tr>
</tbody>
</table>

Postop duplex follow up

Postop CT
6 weeks postop

3 months postop

6 months postop

< 50% coverage

75-100% coverage

Less than 20% coverage of stent

100% coverage

100% coverage

2mm gaps

5mm gaps

8mm gaps

8mm gaps

2mm gaps

5mm gaps

8mm gaps
6 weeks postop

Less than 20% coverage of stent

3 months postop

< 50% coverage

50-75% coverage

6 months postop

75% coverage

75-100% coverage

100% coverage

100% coverage
Results (after 6 months (group 3))

- Microscopic analysis:
  - Connective tissue proliferation
  - Endothelialization
  - Intimal thickness

Significant difference
Summary

- Less material burden showed faster and optimized endothelialization
- Less material burden showed less neointimal hyperplasia
- Overstenting of tributaries did not affect their patency
- More overlap zone between 2 stents might lead to less and worse endothelialization
- Small skip segments are probably not disadvantageous in venous stenting
- At least 6 months of anticoagulation should be administered
Thank you very much

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