The SPIDERgraft: can this Novel Technique decrease Complications after Thoracoabdominal Repair?

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Disclosures

- Institutional Research-grants COOK and Bayer
- Consultant with Bayer (EC, Voyager Trial)
- Consultant with Terumo Aortic
Open Repair for TAAA
Declining Numbers

Outcomes of 3309 thoracoabdominal aortic aneurysm repairs

Joseph S. Coselli, MD, a,b,c,d,e Scott A. LeMaire, MD, a,b,c,d,e Ourania Preventza, MD, a,b,c,d,e Kim I. de la Cruz, MD, a,d,e Denton A. Cooley, MD, d Matt D. Price, MS, a,d Alan P. Stolz, MEd, a,d Susan Y. Green, MPH, a,d Courtney N. Arredondo, MSPH, b and Todd K. Rosengart, MD a,c,d,e

Aortic Interventions

1934 - 2016

1987

31 Years

2018
**BEVAR for TAAA**

**Multibranched Stent-Grafts for the Treatment of Thoracoabdominal Aortic Aneurysms: A Systematic Review and Meta-analysis**

Table 1. Characteristics of the Articles Included in the Analysis.

<table>
<thead>
<tr>
<th></th>
<th>Reilly et al, 2012⁹</th>
<th>Ferreira et al, 2012¹⁰</th>
<th>Harrison et al, 2012¹¹</th>
<th>Bisdas et al, 2014¹²</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>81</td>
<td>48</td>
<td>10</td>
<td>46</td>
<td>185</td>
</tr>
<tr>
<td>Mean age, y</td>
<td>73</td>
<td>68</td>
<td>73.8</td>
<td>70.5</td>
<td>71.1</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>62/19</td>
<td>33/15</td>
<td>6/4</td>
<td>36/10</td>
<td>137/48</td>
</tr>
<tr>
<td>Mean follow-up, mo</td>
<td>21.2</td>
<td>8</td>
<td>NA</td>
<td>9.7</td>
<td>14.6</td>
</tr>
<tr>
<td>Branch patency, %</td>
<td>94.8</td>
<td>99.5</td>
<td>100</td>
<td>97.8</td>
<td>97.1</td>
</tr>
<tr>
<td>30-day mortalityb</td>
<td>3 (3.7)</td>
<td>10 (21)</td>
<td>1 (10)</td>
<td>2 (4.3)</td>
<td>16 (8.6)</td>
</tr>
<tr>
<td>All-cause mortalityb</td>
<td>23 (28.4)</td>
<td>19 (39.6)</td>
<td>1 (10)</td>
<td>8 (17.4)</td>
<td>51 (27.6)</td>
</tr>
<tr>
<td>Secondary interventionsb</td>
<td>42 (51.9)</td>
<td>3 (6.3)</td>
<td>1 (10)</td>
<td>8 (17.4)</td>
<td>54 (29.2)</td>
</tr>
</tbody>
</table>

Hu et al. 2016; J Endovasc Ther 23:626-33
Staging Techniques
Staging Techniques

First-in-man endovascular preconditioning of the paraspinal collateral network by segmental artery coil embolization to prevent ischemic spinal cord injury

Christian D. Etz, MD, PhD, a E. Sebastian Debus, MD, PhD, b Friedrich-Wilhelm Mohr, MD, PhD, a and Tilo Kölbl, MD, PhD b

The Journal of Thoracic and Cardiovascular Surgery • April 2015

MISACE – first report in man:

* First procedure in LA:
  * SA-Embolisation one territory

* Second Procedure in GA:
  * Standard branched/fenestrated ER
  * Standard OR
Spidergraft Idea
Frozen Elephant Trunk
Reversed FET
Reversed Frozen Elephant Trunk Technique to Treat a Type II Thoracoabdominal Aortic Aneurysm

E. Sebastian Debus, MD, PhD¹, Tilo Kölbel, MD, PhD¹, Sabine Wipper, MD, PhD¹, Holger Diener, MD¹, Beate Reiter, MD², Christian Detter, MD, PhD², and Nikolaos Tsilimparis, MD, PhD¹
Reversed FET

Debus et al. 2017; J Endovasc Ther 24: 2777-280
Modifications

➢ Nose Cone
Modifications

- Nose Cone
- Hooks
Modifications

- Nose cone
- Hooks
- Reinforcement of ring-stents
Modifications

- Nose cone
- Hooks
- Reinforcement of ring-stents
- Side branches
- Loop-graft
Modifications

- Nose cone
- Hooks
- Reinforcement of ring-stents
- Side branches
- Loop-graft
Spidergraft Deployment
Study Protocol

Open repair (control):
n=6 domestic pigs (75-85kg)

Spider-Graft:
n=6 domestic pigs (75-85kg),
Study Protocol

- Technical feasibility
- Hemodynamic parameters (HD)
- Blood-flow (Transit-Time flow measurement)
- Ischemic time of related organs
- Organ perfusion (Fluorescent Microspheres)
- Angiography
- Post Mortem CT angiography

Swan-Ganz Catheter:
CVP, PAP, LAP, PVR, BGA

PICCO:
MAP, HR, CO, SVR, GEDV, BGA

Transit-Time flow measurement (TTFM):
Coeliac trunc, superior mesenteric artery, left renal artery, lliac arteries
Results

Patency of all branches in all animals of both groups.

- Intraop. DSA
- Post-mortem CTA
### Ischemic Times

<table>
<thead>
<tr>
<th></th>
<th>OAR (control)</th>
<th>SPIDER graft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ischemic time</td>
<td>88.3 ± 16.3 min</td>
<td>4.2 ± 1,0 min + single anastomosis</td>
</tr>
<tr>
<td>Coeliac trunc</td>
<td>25.3 ± 3.3 min</td>
<td>11 ± 2.4 min</td>
</tr>
<tr>
<td>Superior mesenteric</td>
<td>36.6 ± 6.2</td>
<td>8.8 ± 2.3 min</td>
</tr>
<tr>
<td>arterial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right renal artery</td>
<td>56.1 ± 9.2 min</td>
<td>13.4 ± 3.8 min</td>
</tr>
<tr>
<td>Left renal artery</td>
<td>66.1 ± 11.1 min</td>
<td>21.2 ± 4.7 min</td>
</tr>
<tr>
<td>Right iliac artery</td>
<td>75.2 ± 14.2 min</td>
<td>8.8 ± 1.9 min</td>
</tr>
<tr>
<td>Iliac arteries</td>
<td>88.3 ± 16.3 min</td>
<td>7.8 ± 2.3</td>
</tr>
</tbody>
</table>

## TTFM Flow

<table>
<thead>
<tr>
<th></th>
<th>TTFM Base (ml/min)</th>
<th>OAR post (ml/min)</th>
<th>SPIDER post (ml/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>462 ± 116</td>
<td>450 ± 142</td>
<td>573 ± 182</td>
</tr>
<tr>
<td>SMA</td>
<td>555 ± 189</td>
<td>650 ± 231</td>
<td>560 ± 141</td>
</tr>
<tr>
<td>LRA</td>
<td>354 ± 102</td>
<td>120 ± 89</td>
<td>251 ± 197</td>
</tr>
<tr>
<td>RIA</td>
<td>541 ± 151</td>
<td>600 ± 210</td>
<td>363 ± 96</td>
</tr>
<tr>
<td>LRA</td>
<td>580 ± 174</td>
<td>600 ± 198</td>
<td>363 ± 92</td>
</tr>
</tbody>
</table>
Spinal Cord Perfusion

- T1
- T2
- T3

**Fluorescent Microspheres**
Conclusion

- Open TAAA-repair declining and limited to young patients and genetic aortic syndromes.
- Clinical need for alternative approaches due to high mortality and morbidity.
- Reversed Frozen Elephant Trunk technique with the Spidergraft combines advantages of endovascular and open repair and has proven to be technically feasible in a porcine model.
Thank you for your attention
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**Scientific Coordinator:** Alison Halliday

**Scientific Organization:** Christian-Alexander Behrendt, Eike Sebastian Debus, Holger Diener

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