Mid-term Data from the PERICLES Registry

Jason T. Lee, MD, on behalf of the PERICLES collaborators

PERICLES Registry (2008-2013)

- 13 centers (4 US, 9 Europe)
- 517 patients (119 US, 398 Europe)

- Stanford (55)
- U Florida (27)
- U Kentucky (20)
- U Penn (17)
- Munster (107)
- Zurich (90)
- Udine (61)
- Rome (39)
- Ourense (29)
- Trieste (24)
- Chemnitz (15)
- Barcelona (12)
- Tampere (13)

N=517
898 snorkel/chimney grafts

Results (f/u 17.1 months)

- Elective 30-day mortality: 3.6%
- Primary Patency: 94.1%
- Type Ia endoleak: 2.9%
- 2nd intervention: 6.6%
- Rupture: 0%

Financial Disclosures

The authors have no financial disclosures related to this presentation

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What about late outcomes?

Long-term analysis

PERICLES Registry
N=517 patients
898 snorkel/chimney grafts
Initial data collection 12/31/13, revised to 12/31/15

> 2.5 years follow-up

Subset analysis
N=244 patients
387 snorkel/chimney grafts
46.7 months mean f/u
Anatomic & Device Characteristics (n=244)

<table>
<thead>
<tr>
<th>Max Diameter</th>
<th>Infrarenal neck diameter</th>
<th>Infrarenal neck length</th>
</tr>
</thead>
<tbody>
<tr>
<td>63.6mm (48-116)</td>
<td>26.5mm (18-42)</td>
<td>4.8mm (0-13)</td>
</tr>
</tbody>
</table>

Snorkel Grafts n=387
- Right Renal: 146 (38%)
- Left Renal: 178 (46%)
- Acc. Renal: 11 (2.8%)
- SMA: 42 (11%)
- Celiac: 10 (2.6%)

Snorkel Graft %
- Viabahn: 55.7%
- iCAST: 38.1%
- Bare Metal: 6.2%

Mean (range)

<table>
<thead>
<tr>
<th>Max Diameter</th>
<th>Endograft</th>
<th>Length</th>
</tr>
</thead>
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<tr>
<td>26.5mm (18-42)</td>
<td>4.8mm (0-13)</td>
<td>4.6mm (0-13)</td>
</tr>
</tbody>
</table>

Main Body Endograft (n)
- Endurant: 134 (57.4%)
- Zenith: 40 (16.4%)
- Excluder: 35 (14.3%)
- Jotec: 12 (4.9%)
- Talent: 4 (1.6%)
- Other: 19 (7.8%)

RESULTS: Loss of Branch Patency

Mean f/u 46.7 months

Results: Loss of Branch Patency - Anatomic/Device Predictors

Univariate Multivariate

<table>
<thead>
<tr>
<th>Predictor</th>
<th>OR 95% CI</th>
<th>P value</th>
<th>OR 95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA Max diameter (mm)</td>
<td>0.99 0.96-1.02</td>
<td>0.741</td>
<td>0.98 0.95-1.02</td>
<td>0.577</td>
</tr>
<tr>
<td>Native Neck Diameter ≥30</td>
<td>1.13 1.03-1.23</td>
<td>0.01 0.86-1.19</td>
<td>0.41</td>
<td></td>
</tr>
<tr>
<td>Absence of Infrarenal Neck</td>
<td>0.98 0.89-1.07</td>
<td>0.41</td>
<td>0.98 0.89-1.07</td>
<td>0.56</td>
</tr>
<tr>
<td>Snorkel Seal Length (mm)</td>
<td>0.99 0.95-1.04</td>
<td>0.99</td>
<td>0.99 0.95-1.04</td>
<td>0.99</td>
</tr>
<tr>
<td>Suprarenal Fixation</td>
<td>0.94 0.82-1.08</td>
<td>0.49</td>
<td>0.94 0.82-1.08</td>
<td>0.49</td>
</tr>
<tr>
<td>Balloon-expandable chimneys</td>
<td>0.95 0.79-1.13</td>
<td>0.62</td>
<td>0.95 0.79-1.13</td>
<td>0.62</td>
</tr>
<tr>
<td>Total number, chimney grafts</td>
<td>1.11 0.85-1.48</td>
<td>0.85</td>
<td>1.11 0.85-1.48</td>
<td>0.85</td>
</tr>
<tr>
<td>Lining BMS</td>
<td>1.13 0.80-1.63</td>
<td>0.58</td>
<td>1.13 0.80-1.63</td>
<td>0.58</td>
</tr>
<tr>
<td>No predictors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sac regression

Mean Pre-op Sac Diameter: 63.6±13.4
Mean Latest F/U Sac Diameter: 55.5±17.1
Mean Sac Regression: 7.8±11.4

Persistent/Late T1a Endoleak

No predictors
RESULTS

Gutter Type 1a endoleak (n=14) 5.9%
Type 1a-related re-intervention (n=7) 2.9%

<table>
<thead>
<tr>
<th></th>
<th>Univariate</th>
<th></th>
<th></th>
<th></th>
<th>Multivariate</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
<td>P value</td>
<td>OR</td>
<td>95% CI</td>
<td>P value</td>
<td></td>
</tr>
<tr>
<td>AAA Max diameter (mm)</td>
<td>1.00</td>
<td>0.97-1.04</td>
<td>.758</td>
<td>1.02</td>
<td>0.97-1.07</td>
<td>.416</td>
<td></td>
</tr>
<tr>
<td>Native Neck Diameter &gt;30</td>
<td>1.05</td>
<td>1.07-1.52</td>
<td>.004</td>
<td>4.86</td>
<td>1.42-16.5</td>
<td>.012</td>
<td></td>
</tr>
<tr>
<td>Absence of Infrarenal Aneurysm</td>
<td>1.92</td>
<td>0.89-4.00</td>
<td>.763</td>
<td>2.61</td>
<td>0.86-8.03</td>
<td>.127</td>
<td></td>
</tr>
<tr>
<td>Snorkel Total Length (mm)</td>
<td>0.99</td>
<td>0.93-1.05</td>
<td>.737</td>
<td>0.99</td>
<td>0.89-1.09</td>
<td>.384</td>
<td></td>
</tr>
<tr>
<td>Suprarenal Fixation</td>
<td>1.44</td>
<td>0.39-5.43</td>
<td>.603</td>
<td>1.07</td>
<td>2.23-5.17</td>
<td>.029</td>
<td></td>
</tr>
<tr>
<td>Balloon-expandable chimney</td>
<td>2.36</td>
<td>0.59-1.43</td>
<td>0.178</td>
<td>2.63</td>
<td>0.66-12.3</td>
<td>.317</td>
<td></td>
</tr>
<tr>
<td>Total number, chimney grafts</td>
<td>0.02</td>
<td>0.40-1.73</td>
<td>0.63</td>
<td>0.50</td>
<td>16.59-244</td>
<td>.244</td>
<td></td>
</tr>
<tr>
<td>Living BMD</td>
<td>0.05</td>
<td>1.2-2.59</td>
<td>0.60</td>
<td>0.52</td>
<td>0.09-7.76</td>
<td>.445</td>
<td></td>
</tr>
</tbody>
</table>

Tolenaar et al. JVS 2013;607-15.

Total Cohort Mortality (n=517)

Survival
- 1 year: 87.5%
- 2 year: 81.9%
- 3 year: 74.3%
- 4 year: 70.8%
- 5 year: 66.0%

Occlusion free-survival of BECS

Occlusion free-survival based on number of stents and endolining
Summary

The PERICLES registry is the largest collection to date of the snorkel/chimney EVAR strategy and reports excellent mid-term results compared to f-EVAR:

<table>
<thead>
<tr>
<th></th>
<th>PERICLES</th>
<th>Linsen et al</th>
<th>Di et al</th>
</tr>
</thead>
<tbody>
<tr>
<td># PATIENTS</td>
<td>517</td>
<td>629</td>
<td>776</td>
</tr>
<tr>
<td># grafts</td>
<td>898</td>
<td>1622</td>
<td>1728</td>
</tr>
<tr>
<td>Mortality</td>
<td>3.7%</td>
<td>2.1%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Type I endoleak</td>
<td>5.8%</td>
<td>4.6%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Branch patency</td>
<td>94.1%</td>
<td>93.1%</td>
<td>94.9%</td>
</tr>
<tr>
<td>2nd intervention</td>
<td>6.6%</td>
<td>17.8%</td>
<td>17.6%</td>
</tr>
</tbody>
</table>

Summary/Conclusions - ChEVAR

- Long-term branch patency over 92% at 4 years
- 5.9% gutter Type 1a endoleak (50% needing treatment)
- Larger necks (>30mm) associated with nearly 5X risk for gutter Type 1a endoleak
- Increasing # of chimneys worsens patency outcomes
- Endolining worsens patency outcomes
- Nitinol/polyester endograft with BECS has better survival
- Single chimney has better survival over multiple chimneys