The PERICLES registry: Outcomes of chimney-EVAR in 517 patients from 13 centers

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on behalf of the PERICLES registry collaborators

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Disclosure

Speaker name: Konstantinos P. Donas

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
PERICLES registry

Performance of the chimney technique in the treatment of pararenal pathologies:

A multicenter trans-Atlantic registry
Chimney technique

• Current evidence base

Plethora of single-center series
Current evidence base

• Limited number of patients

• Wide variety of treated entities

• Several combinations of off-the-shelf devices
To provide the latest pooled evidence about
chimney grafts in pararenal pathologies

To resolve the controversy and to see if the
skepticism about them is justified
USA

Stanford University

Florida University

Kentucky University

Pennsylvania University
Europe

St. Franziskus and University Münster
University of Zurich
University of Barcelona
University of Ourense
Tampere University Hospital
S. Filippo Neri Hospital, Rome
University of Trieste
University of Udine
Chemnitz Hospital
Europe

St. Franziskus and University Münster
University of Zurich
University of Barcelona
University of Ourense
Tampere University Hospital
S. Filippo Neri Hospital, Rome
University of Trieste
University of Udine
Chemnitz Hospital
Collected World Experience About the Performance of the Snorkel/Chimney Endovascular Technique in the Treatment of Complex Aortic Pathologies

The PERICLES Registry

Konstantinos P. Donas, MD,* Jason T. Lee, MD,† Mario Lachat, MD‡ Giovanni Torsello, MD, PhD.§ and Frank J. Veith, MD¶ on behalf of the PERICLES Investigators

Objectives: We sought to analyze the collected worldwide experience with use of snorkel/chimney endovascular aneurysm repair (EVAR) for complex abdominal aneurysm treatment.

Background: EVAR has largely replaced open surgery worldwide for anatomically suitable aortic aneurysms. Lack of availability of fenestrated and branched devices has encouraged an alternative strategy utilizing parallel or snorkel/chimney grafts (ch-EVAR).

Methods: Clinical and radiographic information was retrospectively reviewed and analyzed on 517 patients treated by ch-EVAR from 2008 from 2014 by prearranged defined and documented protocols.

Results: A total of 119 patients in US centers and 398 in European centers were treated during the study period. US centers preferentially used Zenith stent-grafts (54.2%) and European centers Endurant stent-grafts (62.2%) for the main body component. Overall 898 chimney grafts (49.2% balloon expandable, 39.6% self-expanding covered stents, and 11.2% balloon expandable bare metal stents) were placed in 692 renal arteries, 156 superior mesenteric arteries (SMA), and 50 celiac arteries. At a mean follow-up of 17.1 months (range: 1–70 months), primary patency was 94%, with secondary patency of 95.3%. Overall survival of patients in this high-risk cohort for open repair at latest follow-up was 79%.

Conclusions: This global experience represents the largest series in the ch-EVAR literature and demonstrates comparable outcomes to those in published reports of branched/fenestrated devices, suggesting the appropriateness of broader applicability and the need for continued careful surveillance. These results support ch-EVAR as a valid off-the-shelf and immediately available alternative in the treatment of complex abdominal EVAR and provide impetus for the standardization of these techniques in the future.

Keywords: abdominal aortic aneurysm, endovascular, fenestrated, thoracoabdominal, vascular


The snorkel/chimney technique is an endovascular therapeutic modality for branch revascularization in complex aortic pathologies that has gained increasing popularity since the first publications.
Methods

• Data were collected in a standardized and uniform manner

• All commercially available abdominal endografts and chimney grafts were included

• Statistical analysis: Stanford University, US

• Non-industry funded project
## Indications

<table>
<thead>
<tr>
<th>Disease</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degenerating Aneurysm</td>
<td>85.2%</td>
</tr>
<tr>
<td>Type Ia endoleak after prior EVAR</td>
<td>8.7%</td>
</tr>
<tr>
<td>Para-anastomotic aneurysm after AAA Repair</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical Status</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>80.2%</td>
</tr>
<tr>
<td>Symptomatic</td>
<td>10.1%</td>
</tr>
<tr>
<td>Rapidly growing</td>
<td>4.1%</td>
</tr>
<tr>
<td>Rupture</td>
<td>5.6%</td>
</tr>
</tbody>
</table>
## Device Characteristics

### Abdominal Main Body Endograft

<table>
<thead>
<tr>
<th>Device</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endurant</td>
<td>260</td>
<td>50.2%</td>
</tr>
<tr>
<td>Zenith</td>
<td>91</td>
<td>17.2%</td>
</tr>
<tr>
<td>Excluder</td>
<td>75</td>
<td>14.5%</td>
</tr>
<tr>
<td>Jotec</td>
<td>17</td>
<td>3.2%</td>
</tr>
<tr>
<td>Other devices</td>
<td>74</td>
<td>14.9%</td>
</tr>
</tbody>
</table>
# Target vessels and types of chimney grafts

<table>
<thead>
<tr>
<th>Chimney Grafts</th>
<th>n=898</th>
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<tbody>
<tr>
<td>Right Renal</td>
<td>342 (38%)</td>
</tr>
<tr>
<td>Left Renal</td>
<td>306 (34%)</td>
</tr>
<tr>
<td>Acc. Renal</td>
<td>34 (3.7%)</td>
</tr>
<tr>
<td>SMA</td>
<td>156 (17%)</td>
</tr>
<tr>
<td>Celiac</td>
<td>50 (5.6%)</td>
</tr>
</tbody>
</table>

1.7 vessels/patient

<table>
<thead>
<tr>
<th>Type</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balloon-expandable (Covered)</td>
<td>49.2%</td>
</tr>
<tr>
<td>Self-expanding (Covered)</td>
<td>39.6%</td>
</tr>
<tr>
<td>Balloon-expandable (Bare Metal)</td>
<td>11.2%</td>
</tr>
</tbody>
</table>
New neck length

Infrarenal neck length $4.8 \pm 7.4$ mm

Neck length/seal zone changed to $21.1 \pm 12.7$ (9-43) mm
Perioperative Outcomes

Technical Success: 97.1%

- Intra-op type Ia endoleak: 7.9%
- Persistent intra-op type Ia endoleak: 2.9%
- Type IA endoleak at latest fu: 5.8%

...for 517 patients from 13 international centers
AAA follow-up (17.1 months, 1-70)

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<table>
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<tr>
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<tbody>
<tr>
<td><strong>Mean Pre-op Sac Diameter (mm)</strong></td>
<td>65.9±21.6</td>
</tr>
<tr>
<td><strong>Mean Latest F/U Sac Diameter (mm)</strong></td>
<td>61.2±19.7, p.001</td>
</tr>
</tbody>
</table>
Primary Patency of the chimney grafts

94.1% at latest f/u
Key findings

• Reproducible results for 13 European and US centers and > 500 treated patients with high intraoperative success

• Low incidence of persistent or new onset of type IA endoleaks after Ch-EVAR in case of a new neck length of 20 mm
Conclusions

• Chimney EVAR is a safe and effective alternative endovascular treatment for juxtarenal pathologies

• Widespread skepticism that has existed is probably not justified

• PERICLES registry helps to bring chimney grafts “out of the shadows”
Conclusions

- Further studies are ongoing to identify the best combinations of aortic and chimney grafts to achieve optimal results.
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