The use of chimney grafts in the treatment of type Ia endoleaks after previous endovascular aneurysm repair: mid-term outcomes from the PERICLES registry

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Disclosure

Speaker name:
.........SONIA RONCHEY............................................................

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
EL-IA > EV treatments option

- Cuff
- Palmaz Stent
- Embolization (coils, n-butylcyanoacrilate, Onix)
- Endoanchor
- FEVAR
- CHIMNEY GRAFT

SHORT NECK/NO NECK
Late rescue of proximal endograft failure using fenestrated and branched devices

Zenia Martin, MD, a Roy K. Greenberg, MD, a,b Tara M. Mastracci, MD, a Matthew J. Eagleton, MD, a Adrian O’Callaghan, MD, a and James Bena, MS, c Cleveland, Ohio J Vasc Surg. 2014 Jun;59(6):1479-87.

Rescue of failed endovascular aortic aneurysm repair using the fenestrated Anaconda device

Jürgen Falkensammer, MD, a,b Fadi Taher, MD, a Miriam Uhlmann, MD, a Kornelia Hirsch, MD, a Johannes Strassegger, MD, a and Afshin Assadian, MD, a Vienna, Austria J Vasc Surg. 2017 Nov;66(5):1334-1339.

- Technical success: 58.3-92.3%
- Target vessel failure: 5.4-8%
CHIMNEY ADVANTAGES

• Off the shelf
• Standardized at abdominal level (IFU)
• Graft diameter equal/smaller to the SG in place
• No problem with
  – distal tortuosity
  – the short length of the body of prev SG
  – markers and skeleton of the prev SG
• No need for graft orientation
• Cannulation from above before main graft deployment (less problem with free flow)

• Shorter aortic coverage
Use of parallel grafts to save failed prior endovascular aortic aneurysm repair and type Ia endoleaks

A 12-Year Experience With Chimney and Periscope Grafts for Treatment of Type I Endoleaks

2015, JVS, Donas
MUNICH

2015, JEVT, Montelione
ZURICH
Endovascular Aneurysm Sealing (EVAS) and Chimney EVAS in the Treatment of Failed Endovascular Aneurysm Repairs

Marwan Youssef, MD¹, Sebastian Zerwes, MD², Rudolf Jakob, MD², Oroa Salem, MD¹, Fritz Dünschede, MD, PhD¹, Christian F. Vahl, MD, PhD¹, and Bernhard Dorweiler, MD, PhD¹

Abstract

Purpose: Technical success 13/13 100%

Patients at 2 institutions with failed endovascular aneurysm repairs were treated with EVAS or chimney EVAS (chEVAS) because other established methods are infeasible or not available.

Results: Death 1 (r-AAA) 7.6%
Renal artery lesions 1 7.6%
Mean Follow-up 8 mths

Death 0%

Chimney patency 100%

References


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19 CASES

TECHNICAL SUCCESS  100%
REINTERVENTION (TYPE III EL)  1  5.2%

CHIMNEY PATENCY (MEAN FUP 520 DAYS)  100%
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

PERICLES investigators are as follows: Ronald L. Dalman, MD, Kenneth Tran, MD, Stanford University Medical Center, Stanford, CA; Felice Pecoraro, MD, Zurich University Hospital, Zurich, Switzerland; Theodosios Bisdas, MD, St. Franziskus-Hospital Münster, Münster, Germany; Sven Seifert, MD, Mirko Esche, MD, Clinicum Chemnitz, Chemnitz, Germany; Daniele Gasparini, MD, Paolo Frigatti, MD, University Hospital S. Maria della Misericordia of Udine, Udine, Italy; Roberto Adovasio, MD, Fabio Pozzi Mucelli, MD, University Hospital Cattinara, Trieste, Italy; Scott M. Damrauer, MD, Hospital of the University of Pennsylvania, Philadelphia, PA; Edward Y. Woo, MD, Medstar Health, Washington, DC; Adam Beck, MD, Salvatore Scali, MD, University of Florida Medical Center, Gainsville, FL; David Minion, MD, University of Kentucky Medical Center, Lexington, KY; Juha Salenius, MD, Velipekka Suomi-nen, MD, University of Tampere, Tampere, Finland; Nicola Mangialardi, MD, Sonia Ronchey, MD, Stefano Fazzini, MD, San Filippo Neri Hospital, Rome, Italy; Gaspar Mestres, MD, Vincent Riambau, MD, University of Barcelona, Barcelona, Spain; and Nilo J. Mosquera, MD, University of Ourense, Ourense, Spain.
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Ann Surg 2015, KP Donas-JT Lee, 262; 546-553

517 Ch-EVAR/ 898 CGs
(13 centers)

United States: 119 patients
Europe: 398 patients

898 chimney grafts placed
692 RA, 156 MSA, 50 CT

11.2% balloon-expandable bare-metal stents
49.2% balloon-expandable covered stents
39.6% self-expanding covered stents

Mean follow-up: 17.1 months
Primary patency: 94%
Secondary patency: 95.3%
Overall survival: 79%

No sponsorship from industry
Collected World Experience About the Performance of the Snorkel/Chimney Endovascular Technique in the Treatment of Complex Aortic Pathologies

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Ann Surg 2015, KP Donas-JT Lee, 262; 546-553

517 Ch-EVAR/ 898 CGs
(13 centers)

39 Ch-EVAR/ 70 CGs
For Type IA endoleak
PERICLES and EL-IA → 39 CASES (70 CHIMNEYS)

**Demographics**

<table>
<thead>
<tr>
<th>n – (%) or mean +/- SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>ASA III</td>
</tr>
<tr>
<td>ASA IV</td>
</tr>
</tbody>
</table>

**Cause for EL-IA**

- Neck degeneration: 21 – 53.8%
- Migration: 18 – 46.2%

**Indication**

- Juxtarenal AAA: 32 – 82.1%
- Suprarenal AAA: 5 – 12.8%
- Type IV TAAA: 2 – 5.1%

**AAA anatomical features**

- Infrarenal neck diameter (mm): 27.0 ± 5.2
- Infrarenal neck length (mm): 3.9 ± 4.0
- AAA diameter (mm): 71.5 ± 29.0
## Operative variables

### Endograft

<table>
<thead>
<tr>
<th>Endograft</th>
<th>n (%) or mean +/- SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medtronic Endurant</td>
<td>20 – 51.3%</td>
</tr>
<tr>
<td>Other devices</td>
<td>19 – 48.7%</td>
</tr>
<tr>
<td>Cook Zenith</td>
<td>7 – 18.0%</td>
</tr>
<tr>
<td>Gore C-TAG</td>
<td>4 – 10.3%</td>
</tr>
<tr>
<td>Gore Excluder</td>
<td>3 – 7.7%</td>
</tr>
<tr>
<td>Jotec E-Vita Abdominal</td>
<td>2 – 5.1%</td>
</tr>
<tr>
<td>Cook Zenith TX2</td>
<td>2 – 5.1%</td>
</tr>
<tr>
<td>Other</td>
<td>1 – 2.6%</td>
</tr>
</tbody>
</table>

### Total chimney grafts (n= 70)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Right renal</td>
<td>25 – 35.7%</td>
</tr>
<tr>
<td>Left renal</td>
<td>31 – 44.3%</td>
</tr>
<tr>
<td>SMA</td>
<td>9 – 12.9%</td>
</tr>
<tr>
<td>Celiac</td>
<td>4 – 5.7%</td>
</tr>
<tr>
<td>Accessory renal</td>
<td>1 – 1.4%</td>
</tr>
</tbody>
</table>

### Chimney per patient

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Single chimney</td>
<td>18 – 46.1%</td>
</tr>
<tr>
<td>Multiple chimneys</td>
<td>21 – 53.9%</td>
</tr>
<tr>
<td>2 chimneys</td>
<td>14 – 35.9%</td>
</tr>
<tr>
<td>3 chimneys</td>
<td>4 – 10.3%</td>
</tr>
<tr>
<td>4 chimneys</td>
<td>3 – 7.7%</td>
</tr>
</tbody>
</table>

ZURICH CASE

PERICLES and EL-IA \( \rightarrow \) 39 CASES (70 CHIMNEYS)
PERICLES and EL-IA ➔ 39 CASES (70 CHIMNEYS)

**Operative variables**

<table>
<thead>
<tr>
<th>Types of chimney grafts (n=70)</th>
<th>Total n if obs</th>
<th>Missing (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balloon-expandable covered</td>
<td>31 - (44.2)</td>
<td></td>
</tr>
<tr>
<td>Self-expanding covered</td>
<td>34 - (48.5)</td>
<td></td>
</tr>
<tr>
<td>Balloon-expandable bare metal</td>
<td>5 - (7.1)</td>
<td></td>
</tr>
<tr>
<td>Realining w/ bare metal stent</td>
<td>20 - (28.5)</td>
<td></td>
</tr>
</tbody>
</table>

| Operative time (min)          | 231.2 ± 84.1   | 27          |
| Fluoroscopy time (min)        | 75.8 ± 48.2    | 27          |
| Contrast medium (ml)          | 144.1 ± 69.3   | 28          |

| Type I Endoleak               | 7 – 18.0%      |
| Type Ia                       | 4 – 10.3%      |
| Type Ib                       | 3 – 7.7%       |
| Treated type Ia/Ib endoleak   | 6 – 15.4%      |
### Outcomes

<table>
<thead>
<tr>
<th>Follow-up (months)</th>
<th>21.9 – (0.23 – 72.3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to last CTA/MRA</td>
<td>21.9 – (0.23 – 72.3)</td>
</tr>
</tbody>
</table>

### Anatomy

<table>
<thead>
<tr>
<th>New neck length</th>
<th>20.4 ± 4.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-op max AAA Ø decrease</td>
<td>1,6 ± 0,486</td>
</tr>
</tbody>
</table>

### Mortality (n=3) (1 cardiac-2 pneumonia)

<table>
<thead>
<tr>
<th>30-day</th>
<th>1 – 2.6%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>3 – 7.7%</td>
</tr>
</tbody>
</table>

### Any complication (n=8)

<table>
<thead>
<tr>
<th>Late type I endoleak</th>
<th>3 – 7.7%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other devices (n=19)</td>
<td>2 – 10.5%</td>
</tr>
<tr>
<td>Endurant (n=20)</td>
<td>1 – 5.0%</td>
</tr>
<tr>
<td>Treated late type I endoleak</td>
<td>1 – 2.6%</td>
</tr>
<tr>
<td>Chimney occlusion</td>
<td>4 – 10.3% of pts</td>
</tr>
<tr>
<td>– 5.7% of chimney</td>
<td></td>
</tr>
</tbody>
</table>

### Treated late type I endoleak (n=1)

| Other devices (n=19) | 0 – 0.0% | 1.000* |
|----------------------|----------|
| Endurant (n=20) | 1 – 5.0% |

* Fisher’s exact test.

---

The new sealing zone increased to 20.4 ± 4.2 mm

Post-op max AAA diameter decreased of 1,6 mm (p= 0.486)

Type IA endoleak : 3/70  7.7%

Chimney occlusion : 4/70  5.7%
PERICLES and EL-IA → 39 CASES (70 CHIMNEYS)

Chimney occlusion: pts 10,3%
chimney 5,7%

Freedom from Occlusion

Probability

# at risk

0

39  22  16  14  10  9  5

Months after procedure
PERICLES and EL-IA $\rightarrow$ 39 CASES (70 CHIMNEYS)

**ENDURANT vs OTHER DEVICE**

**SELF EXP vs BALL EXP**

![Graph](Image)

**Freedom from Occlusion**

Log rank test $P = 0.508$

# at risk

- Other device: 20 13 10 9 7 6 3 3
- Endurant: 19 9 6 5 3 3 3 3

![Graph](Image)

**Freedom from Occlusion**

Log rank test $P = 0.090$

# at risk

- CPBECs or CPBMS: 17 14 10 8 7 6 3 3 2
- CPSECS: 20 14 10 8 7 6 3 3 3
CONCLUSIONS

✓ “EASIER” TECHNIQUE
✓ SAFE, EFFECTIVE, REPRODUCIBLE

✓ HIGH TECHNICAL SUCCESS INDEPENDENT FROM SG CHOICE
✓ NO ANEURYSM RELATED MORTALITY
✓ NO SECONDARY RUPTURE
✓ HIGH IMMEDIATE TARGET VESSEL PATENCY
✓ GOOD MID TERM TARGET VESSELS PATENCY
✓ STRICT FOLLOW-UP
THANK YOU
The use of chimney grafts in the treatment of type Ia endoleaks after previous endovascular aneurysm repair: mid-term outcomes from the PERICLES registry