Best treatment of Type 1A Endoleaks

**Prevention!**

- Incidence varies in series <1-13%
- Increased incidence in non-IFU anatomy
- Large diameter necks (> 30 mm)
- Conical neck
- Angulated or diseased neck
- Leaving the OR without a Type 1 endoleak is not a guarantee
  - Most type 1 endoleaks occur over the ensuing 5 years
  - Poor initial neck diameter is a predictor of long term neck behavior
  - Forcing EVAR into a poor anatomic substrate is a strategy for failure
Aneurysm sac failure to regress after endovascular aneurysm repair is associated with lower long-term survival


VQI >14,000 EVAR with 1-year imaging data
Overall: 25% Sac Expansion

Outcomes over Time in Patients with Hostile Neck Anatomy Undergoing Endovascular Repair of Abdominal Aortic Aneurysm

Yolanda Bryce, MD, Wonho Kim, MD, Barry Katzen, MD, James Benenati, MD, and Shaun Samuels, MD

Table 1. Hostile Neck Parameters

<table>
<thead>
<tr>
<th>Hostile Neck Parameter</th>
<th>Total (n = 125)</th>
<th>Early Period (n = 81)</th>
<th>Late Period (n = 64)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck length ≤ 10 mm</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Focal bulge in the neck &gt; 2 mm</td>
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</tr>
<tr>
<td>&gt; 2-mm reverse taper within 1 cm below the renal arteries</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Neck thrombus or calcification ≥ 50% of the circumference</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angulation ≥ 60% below within 3 cm the renal arteries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Outcomes

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total (n = 125)</th>
<th>Early Period (n = 81)</th>
<th>Late Period (n = 64)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1a endoleak (n, %)</td>
<td>16 (13.6%)</td>
<td>15 (19.2%)</td>
<td>6 (9.2%)</td>
<td>.327</td>
</tr>
<tr>
<td>AAA sac regression (n, %)</td>
<td>81 (45.7%)</td>
<td>44 (54.3%)</td>
<td>37 (57.8%)</td>
<td>.036</td>
</tr>
<tr>
<td>AAA sac expansion (n, %)</td>
<td>28 (22.4%)</td>
<td>17 (21.6%)</td>
<td>11 (17.2%)</td>
<td>.153</td>
</tr>
</tbody>
</table>

Incidence of Type I endoleak between F group & SF group

7.8 vs. 20.3 %
P-value=0.045

JVIR 2018; 29:1011-16
Type 1A Endoleak Treatment Options

Endovascular
- Extension cuff/stent with or without snorkels etc
- Endoanchors
- ZFEN conversion
- MBEG conversion

Open Repair
- Supra-renal or supra-ceeliac clamping
- Trans-abdominal vs RP approach
- Higher risk than initial elective repair (4-27% 30 day mortality)

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- 86 yo M, s/p EVAR 2010 for 5.6 cm AAA
- Medtronic Talent 32 mm main body
- Enlarged to 8.2 cm 2016
- Type 1A endoleak
- Juxtarenal AAA
- Former smoker, mild COPD
- Active, high functioning
Open Conversion

- Transperitoneal exposure.
- Proximal control supra-ceeliac, distal control of bilateral iliac limbs.
- Explant main body, transect iliac limbs.
- Proximal anastomosis at level of renals.
- Distal anastomoses to bilateral iliac limbs.

Follow-up CTA

Pre-conversion 

2 years post-conversion
• 77 yo F, s/p EVAR 2013 for 5.7 cm AAA
• Medtronic Talent 28 mm main body
• Enlarged to 8.2 cm 2016
• Type 1A endoleak
• Juxtarenal AAA
• Former smoker, no CAD
• Stage 3 CKD
• Active, high functioning
• Reintervention 10/2016 for Type 1b leak (R iliac)
• Coil Type 2 leak 6/2017

Open Conversion

- Retroperitoneal exposure with partial 11th rib resection.
  - Left kidney down due to retro-aortic left renal vein.
- Proximal control between celiac and SMA, distal control b/l iliac limbs.
- Explant main body, transect iliac limbs.
- Proximal anastomosis at orifice of left renal (w/ limited endarterectomy).
- Distal anastomoses to right graft limb and left external iliac.
• 71 yo M, s/p FEVAR 2015
• 32 mm main body, SMA scallop + 2 fenestrations
• Type 1A endoleak in OR-cuff
• Coil placement adjacent to LRA
• Former smoker, no CAD
• Active, high functioning
• Sac increased to 6.1 cm

Open Conversion

- Transperitoneal exposure.
- Proximal control supraceliac, distal control of bilateral common iliacs.
- Transect stentgraft below left renal, transect iliac limbs.
- 24 x 12 mm Dacron graft selected, 7 mm side branch created (for RRA)
  - Proximal anastomosis to level of left renal, incorporating prior stentgraft.
  - Bypass to right renal with pre-fashioned 7 mm limb.
  - Distal anastomoses to bilateral iliac limbs (left CIA, right EIA).
6 mo post-conversion CTA (video)

**UCSF Center for Aortic Disease**

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### Increasing use of open conversion for late complications after endovascular aortic aneurysm repair

Abhishek Mohapatra, MD, Darve Robinson, BA, Othman Malak, MD, Michael C. Madigan, MD, Efthimios D. Avgerinos, MD, Rabih A. Chaer, MD, Michael J. Singh, MD, and Michel S. Makaroun, MD, Pittsburgh, Pa

#### 30-Day outcome

<table>
<thead>
<tr>
<th></th>
<th>Endoleak, nonsu rupted (n = 65)</th>
<th>Rupture (n = 20)</th>
<th>Infection (n = 15)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>6.2</td>
<td>4.0</td>
<td>4.0</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Hospital LOS, days</td>
<td>7 (6-11.5)</td>
<td>12 (9-30)</td>
<td>12 (8-28)</td>
<td>.01</td>
</tr>
<tr>
<td>Any complication</td>
<td>38.5</td>
<td>45.0</td>
<td>66.7</td>
<td>.14</td>
</tr>
<tr>
<td>MI</td>
<td>0.0</td>
<td>0.0</td>
<td>13.3</td>
<td>.02</td>
</tr>
<tr>
<td>New onset AF</td>
<td>6.2</td>
<td>5.0</td>
<td>13.3</td>
<td>.82</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.5</td>
<td>0.0</td>
<td>0.0</td>
<td>&gt;.99</td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>10.8</td>
<td>15.0</td>
<td>13.3</td>
<td>.74</td>
</tr>
<tr>
<td>AKI</td>
<td>7.7</td>
<td>15.0</td>
<td>33.3</td>
<td>.05</td>
</tr>
<tr>
<td>Reus</td>
<td>9.2</td>
<td>5.0</td>
<td>6.7</td>
<td>&gt;.99</td>
</tr>
<tr>
<td>UTI</td>
<td>4.6</td>
<td>0.0</td>
<td>6.7</td>
<td>.60</td>
</tr>
<tr>
<td>DVT</td>
<td>0.0</td>
<td>0.0</td>
<td>6.7</td>
<td>.15</td>
</tr>
<tr>
<td>Surgical site infection</td>
<td>1.5</td>
<td>0.0</td>
<td>6.7</td>
<td>.52</td>
</tr>
<tr>
<td>Other surgical site complication</td>
<td>4.6</td>
<td>0.0</td>
<td>6.7</td>
<td>.60</td>
</tr>
</tbody>
</table>

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30-day Mortality: 8.1% with graft explant; 3.6% no explant
One year survival 87%

J Vasc Surg 2018 (ePub)
30 day mortality: 6.3% (3.8% for elective conversions)
Increased iliac degeneration when limbs were removed

Table IV: Operative details for elective vs emergent presentation

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Elective repair (n = 26)</th>
<th>Rupture/Emrgent repair (n = 8)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retroperitoneal approach</td>
<td>7 (27)</td>
<td>3 (30)</td>
<td>254</td>
</tr>
<tr>
<td>Transabdominal approach</td>
<td>19 (73)</td>
<td>3 (30)</td>
<td>254</td>
</tr>
<tr>
<td>Aortic cross clamp site</td>
<td>7 (27)</td>
<td>3 (30)</td>
<td>254</td>
</tr>
<tr>
<td>Suprarenal clamp</td>
<td>7 (27)</td>
<td>3 (30)</td>
<td>254</td>
</tr>
<tr>
<td>Suprarenal clamp</td>
<td>6 (23)</td>
<td>2 (25)</td>
<td>254</td>
</tr>
<tr>
<td>Infrarenal clamp</td>
<td>11 (42)</td>
<td>1 (7)</td>
<td>254</td>
</tr>
<tr>
<td>Entire limbs partially removed</td>
<td>6 (23)</td>
<td>4 (47)</td>
<td>254</td>
</tr>
<tr>
<td>Tube graft</td>
<td>7 (27)</td>
<td>2 (25)</td>
<td>254</td>
</tr>
<tr>
<td>Bilateral graft</td>
<td>19 (73)</td>
<td>5 (50)</td>
<td>254</td>
</tr>
<tr>
<td>Estimated blood loss mL, average (SD)</td>
<td>338± (161)</td>
<td>4503 (2514)</td>
<td>4/99</td>
</tr>
<tr>
<td>(SD Standard deviation)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

30 day mortality: 6.3% (3.8% for elective conversions)
Increased iliac degeneration when limbs were removed

Defining risk and identifying predictors of mortality for open conversion after endovascular aortic aneurysm repair

1 = PAR, Age ≥ 65, male sex, normal preoperative stress test, infrarenal cross-clamp, no other risk factors.
2 = EVAR-c, All other factors identical to profile 1.
3 = PAR, Age ≥ 75, normal stress test, infrarenal cross-clamp, no other risk factors.
4 = EVAR-c, All other factors identical to profile 1.
5 = PAR, Age ≥ 75, no stress test, COF-D, Gr > 1.8 mg/dl, infrarenal cross-clamp, no other risk factors.
6 = EVAR-c, other factors identical to profile 1.
Management of failed endovascular aortic aneurysm repair with explantation or fenestrated-branched endovascular aortic aneurysm repair

Agenor P. Dias, MD, Behzad S. Farivar, MD, Sean P. Steenberge, MD, Corey Brier, MA, Yuki Kuramochi, RN, BSN, Sean P. Lyden, MD, and Matthew J. Eagleton, MD, Cleveland, Ohio

Table III. Repair classification

<table>
<thead>
<tr>
<th>Repair class</th>
<th>Explantation (n = 162)</th>
<th>F/B-EVAR (n = 85)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA infrarenal</td>
<td>37 (23)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>AAA juxtarenal</td>
<td>96 (59)</td>
<td>10 (62)</td>
</tr>
<tr>
<td>TAAA type I</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>TAAA type II</td>
<td>0 (0)</td>
<td>9 (11)</td>
</tr>
<tr>
<td>TAAA type III</td>
<td>2 (1)</td>
<td>30 (35)</td>
</tr>
<tr>
<td>TAAA type IV</td>
<td>27 (17)</td>
<td>36 (42)</td>
</tr>
</tbody>
</table>

AAA: Abdominal aortic aneurysm; F/B-EVAR: fenestrated-branched endovascular aneurysm repair. Values are presented as number (%).

J Vasc Surg 2018; 68(1676-87)

Freedom From Reintervention

With Number at Risk

Freedom From Mortality

With Number at Risk

J Vasc Surg 2018; 68(1676-87)
Best treatment of Type 1A Endoleaks

Take Home Points

- Elective re-intervention is far safer
- Both open conversion and endovascular interventions needed
  - *Average risk patients* may be better served by open conversion earlier, unless there is a high probability of success endo option in play
  - Open conversion, done electively, has marginally higher morbidity and mortality compared to primary open repair in experienced hands
  - A poor quality neck is best repaired open
  - Multiple failed endovascular interventions increases surgical complexity, and should be avoided in a surgical candidate - avoid the slippery slope