Mid-Term Outcomes of Flared Iliac Limb Used for Combined Common Iliac Artery Aneurysm during EVARs

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Conflicts of Interests

No Disclosure
Introduction

- Common iliac artery (CIA) aneurysms have been reported to be combined in 15% to 40% of patients with abdominal aortic aneurysms (AAAs).

- Ectatic CIA can be treated with flared iliac limbs but a dilated artery used as a sealing zone could increase the risk of a late type 1b endoleak (EL) by 4.5-folds.

- Additional iliac artery growth after EVAR could be associated with increased secondary interventions and/or late aneurysm rupture.

References:
Purpose

- To determine the outcomes of flared iliac limb used for combined common iliac artery aneurysm (CIAA) during endovascular aneurysm repair (EVAR) for AAA
Methods

- From January 2005 to September 2017
- The single center, retrospective study
- Total 444 cases of EVAR
  - Inclusion: 184 CIAAs in 149 patients
  - Group 1: Flared iliac limb (≥ 24mm)
    - 77 limbs in 67 patients
  - Group 2: Hypogastric artery embolization with iliac limb extension
    - 107 limbs in 98 patients
- Exclusion
  - Ruptured AAA, isolated iliac artery aneurysm
Methods

- Early 30-day outcomes
  - Perioperative Type Ib / III
  - Adjuvant or reintervention
  - Limb occlusion/stenosis >50%
  - Mortality and morbidity

- Late outcomes
  - Late Type Ib / III
  - Re-intervention
  - Limb patency
  - Survival
## Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Flared limb (n=67)</th>
<th>IIE + EE (n=98)</th>
<th>Total (n=165)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Median age (years, IQR)</strong></td>
<td>72 (68-77)</td>
<td>71 (66-77)</td>
<td>71.5 (67-77)</td>
<td>0.492&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>AAA (Max. size, mm, IQR)</strong></td>
<td>53.2 (51.3-58)</td>
<td>53.2 (50.9-62)</td>
<td>53.2 (51-60.6)</td>
<td>0.397&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>70 (90.9)</td>
<td>98 (91.6)</td>
<td>168 (91.3)</td>
<td>0.872&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Indication of EVAR</strong></td>
<td></td>
<td></td>
<td></td>
<td>0.176&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>64 (83.1)</td>
<td>80 (74.8)</td>
<td>144 (78.3)</td>
<td></td>
</tr>
<tr>
<td>Symptomatic</td>
<td>13 (16.9)</td>
<td>27 (25.2)</td>
<td>40 (21.7)</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>63 (81.3)</td>
<td>71 (66.4)</td>
<td>134 (72.8)</td>
<td>0.020&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>COPD</td>
<td>24 (32.0)</td>
<td>19 (18.8)</td>
<td>43 (24.4)</td>
<td>0.044&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Diabetes</td>
<td>15 (19.5)</td>
<td>23 (21.5)</td>
<td>38 (20.7)</td>
<td>0.739&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Smoking</td>
<td>40 (53.3)</td>
<td>59 (53.5)</td>
<td>99 (53.8)</td>
<td>0.668&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>48 (64.0)</td>
<td>46 (43.0)</td>
<td>94 (51.1)</td>
<td>0.010&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>IHD</td>
<td>19 (25.3)</td>
<td>33 (30.8)</td>
<td>52 (28.3)</td>
<td>0.359&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Renal disease</td>
<td>2 (2.7)</td>
<td>3 (3.0)</td>
<td>5 (2.8)</td>
<td>1.000&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Mann-Whitney test; <sup>b</sup> Chi-square test; <sup>c</sup> Fisher’s exact test
## 30-day Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Flared limb (n=77)</th>
<th>IIE + EE (n=107)</th>
<th>Total (n=184)</th>
<th>P-value</th>
</tr>
</thead>
</table>
| **Type Ib or III**       | 7 (9.1)            | 1 (0.9)          | 9 (4.9)       | **0.010**
| **Intraoperative Ib**    | 7 (9.1)            | 0                | 7 (3.8)       |         |
| **Limb occlusion or stenosis (>50%)** | 1 (1.3)          | 0                | 1 (0.5)       | **0.418**
| **Adjuvant or 2\textsuperscript{nd} intervention** | 8 (10.4)         | 1 (0.9)          | 9 (4.9)       | **0.004**
| **Mortality**            | 0                  | 0                | 0             |         |

\textsuperscript{a} Fisher’s exact test
## Late Outcomes

*Median follow up duration of 24.4 months*

<table>
<thead>
<tr>
<th>Type</th>
<th>Flared limb (n=77)</th>
<th>IIE + EE (n=107)</th>
<th>Total (n=184)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type Ib</td>
<td>1 (1.3)</td>
<td>0</td>
<td>1 (0.5)</td>
<td>0.418&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Type III</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Limb occlusion or stenosis (&gt;50%)</td>
<td>1 (1.3)</td>
<td>1 (0.9)</td>
<td>2 (2.2)</td>
<td>1.000&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Re-intervention</td>
<td>2 (2.6)</td>
<td>1 (0.9)</td>
<td>3 (1.6)</td>
<td>1.000&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Mortality&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7 (9.1)</td>
<td>11 (10.3)</td>
<td>18 (9.8)</td>
<td>0.789&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Median OPD f/u (IQR, mo)</td>
<td>20.9 (7.5-38.2)</td>
<td>30.4 (6.9-61.6)</td>
<td>24.4 (7.5-55.3)</td>
<td>0.116&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Median CT/duplex f/u (IQR, mo)</td>
<td>12.0 (1.7-31.8)</td>
<td>17.8 (4.2-51.7)</td>
<td>14.1 (3.6-44.3)</td>
<td>0.159&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> No aneurysm-related mortality
<sup>b</sup> Chi-square test;  <sup>c</sup> Fisher’s exact test
Results

Cumulative Type 1b/3 endoleak

Cumulative Limb patency

$P = 0.001$ (Log rank test)

$P = 0.720$ (Log rank test)
Results

Reintervention-free patients survival

Reintervention-free rate (%)

$P = 0.040$ (Log rank test)

$P = 0.006$ (Log rank test)
Case 1.

- 82/M
- 2017.8.18 EVAR d/t AAA (53mm)
Case 2.

- 78/M
- 2013.6.28 EVAR d/t AAA (51mm)
4 years later
Conclusions

- There was a significant higher incidence of type 1b endoleak and intraoperative adjuvant or 2\textsuperscript{nd} re-intervention in flared limb group compared to limb extension during EVAR in the mid-term.

- Close long term follow-up and careful surveillance is mandatory.

- Further study for the risk factors which could be related with late type 1b EL after flared iliac limb usage, would be necessary.
Thank you for your kind attention
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