Open repair of proximal abdominal aneurysms classified according to the equivalent fenestrated endovascular treatment

Alessandro Grandi

Vascular Surgery, “Vita-Salute” - San Raffaele University Scientific Institute Ospedale San Raffaele, Milan – Italy

Chief: Prof. R. Chiesa
Disclosure

Speaker name:
Alessandro Grandi

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
Proximal abdominal aortic aneurysms

- Suboptimal Infrarenal necks
- Complex abdominal aneurysms

Renal arteries

- Short / hostile neck
- Juxtarenal
- Pararenal
- Paravisceral
- Suprarenal

Renal arteries
P-AAAs open repair

- Renal Arteries
- LRA
- RRA
- IMA
Open repair
Clamping sites
Open repair

Perfusion
Revascularization
P-AAAs

Suboptimal necks

- Short neck
- Juxtarenal

Complex abdominal aneurysms

- Parenal
- Paravisceral
- Suprarenal
- Renals
Standard EVAR

Type I EL
Proximal cuff + Endoanchors + Chimneys

Proximal cuff

LRA

RRA

SMA

Endo-anchors
Suboptimal necks yield suboptimal results

“...the requirement of healthy sealing zone should never be compromised with the idea of planning an “easier” procedure”.

Oderich GS, Endovascular Aortic Repair 2017
P-AAAs

Suboptimal necks

- Infrarenal
- Juxtarenal

Complex abdominal aneurysms

- Renals
  - Parenal
  - Paravisceral
  - Suprarenal

Short neck

Infrarenal
✓ Reported experience since 2005

✓ Custom made devices

✓ 4Fen most used configuration
Fenestrated endografts

Suboptimal necks
- 2/3 fenestrations + scallop

Complex abdominal aneurysms
- 4 fenestrations
Specific endo problems (P-AAA)

Endovascular treatment for P-AAA requires long aortic coverage with visceral vessel stenting
Study design: OSR pts 2010-2016

Inclusion Criteria
- P-AAAs (hostile neck, juxta- and supra-renal)
- Preoperative CT-scan (1.5 mm thick)

End-points
- Results of OR according to cross-clamping level (IR, SR, SC)
- Evaluation of equivalent endovascular approach with F-EVAR
OSR contemporary experience
Jan. 2010 – Nov. 2016: 157 cases

93/157 pts included

<table>
<thead>
<tr>
<th>N=157</th>
<th>Males</th>
<th>Elective treatment</th>
<th>Max. diameter</th>
<th>CAD</th>
<th>COPD</th>
<th>IRC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>145 (92)</td>
<td>154 (98)</td>
<td>60.3±15.5</td>
<td>56 (35.7)</td>
<td>27 (17.2)</td>
<td>37 (23.6)</td>
</tr>
</tbody>
</table>

IR: 22
SR: 44
SC: 27

Chiesa et al. J Vasc Surg [In press]
2. Equivalent endovascular approach

Endovascular planning and sizing with custom-made fenestrated endografts was performed.
Results

![Bar chart showing results for 2FEN, 3FEN, and 4FEN with percentages for Supra-celiac, Supra-renal, and Infra-renal segments.]

- 2FEN: 9% Supra-celiac, 45% Supra-renal, 45% Infra-renal
- 3FEN: 20% Supra-celiac, 60% Supra-renal, 20% Infra-renal
- 4FEN: 35% Supra-celiac, 44% Supra-renal, 21% Infra-renal
Results

San Raffaele Scientific Institute - Vascular Surgery - «Vita-Salute» University
### 1. Perioperative results (N=93)

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>IR</th>
<th>SR</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perfusion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None n(%)</td>
<td>28 (30.1)</td>
<td>21 (95.5)</td>
<td>7 (15.9)</td>
<td>0</td>
</tr>
<tr>
<td>Custiodol</td>
<td>60 (64.5)</td>
<td>1 (4.5)</td>
<td>34 (77.3)</td>
<td>25 (92.6)</td>
</tr>
<tr>
<td>Ringer</td>
<td>5 (5.4)</td>
<td>0</td>
<td>3 (6.8)</td>
<td>2 (7.4)</td>
</tr>
<tr>
<td><strong>Reimplantation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None n(%)</td>
<td>65 (69.9)</td>
<td>22 (100)</td>
<td>36 (81.8)</td>
<td>7 (25.9)</td>
</tr>
<tr>
<td>Renal n(%)</td>
<td>13 (14)</td>
<td>0</td>
<td>6 (13.6)</td>
<td>7 (25.9)</td>
</tr>
<tr>
<td>Renal + Visceral n(%)</td>
<td>15 (16.1)</td>
<td>0</td>
<td>2 (4.6)</td>
<td>13 (48.9)</td>
</tr>
<tr>
<td><strong>Need for ICU n(%)</strong></td>
<td>51 (54.8)</td>
<td>5 (22.7)</td>
<td>20 (45.6)</td>
<td>26 (96.3)</td>
</tr>
<tr>
<td><strong>LOS median (n)</strong></td>
<td>6 (5 – 7)</td>
<td>5 (5-7)</td>
<td>6 (6-7)</td>
<td>7 (6-8)</td>
</tr>
<tr>
<td><strong>30-day mortality n(%)</strong></td>
<td>2 (2.2)</td>
<td>0</td>
<td>0</td>
<td>2 (7.4)</td>
</tr>
<tr>
<td><strong>Any MAE n(%)</strong></td>
<td>29 (31.2)</td>
<td>3 (13.6)</td>
<td>12 (27.3)</td>
<td>14 (51.9)</td>
</tr>
</tbody>
</table>
Discussion

Different topics of concern
Complex endo procedures
4Fen vs 2-3Fen

Similar mortality and morbidity in 4Fen vs 2-3Fen

↑ Fluoroscopy time

↑ Contrast media vol.

↑ Operative time
Vessel restenosis/occlusion rate: 3.4-3.6%

<table>
<thead>
<tr>
<th></th>
<th>F-EVAR</th>
<th>Ch-EVAR</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical success</td>
<td>98.2% (3810/3878)</td>
<td>99.5% (623/626)</td>
<td>0.028</td>
</tr>
<tr>
<td>30-day mortality</td>
<td>2.4% (47/1884)</td>
<td>3.2% (12/380)</td>
<td>0.459</td>
</tr>
<tr>
<td>Aneurysm-related</td>
<td>1.4% (27/1884)</td>
<td>3.2% (12/380)</td>
<td>0.018</td>
</tr>
<tr>
<td>mortality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type I endoleak</td>
<td>2.0% (38/1884)</td>
<td>3.4% (13/380)</td>
<td>0.092</td>
</tr>
<tr>
<td>Type II endoleak</td>
<td>5.4% (102/1884)</td>
<td>5.3% (20/380)</td>
<td>0.905</td>
</tr>
<tr>
<td>Target organ</td>
<td>5.0% (185/3658)</td>
<td>4.0% (25/626)</td>
<td>0.27</td>
</tr>
<tr>
<td>function impaired</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vessels restenosis/</td>
<td>3.6% (135/3787)</td>
<td>3.4% (21/339)</td>
<td>0.792</td>
</tr>
<tr>
<td>occluded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aneurysm growth</td>
<td>1.1% (20/1811)</td>
<td>1.6% (6/380)</td>
<td>0.437</td>
</tr>
<tr>
<td>Re-intervention</td>
<td>11.7% (205/1746)</td>
<td>5.6% (19/380)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Source:
- Yaoguo Y et al. Vascular. 2017
# Cost-effectiveness

Window trial – French Ministry of Health founding

<table>
<thead>
<tr>
<th></th>
<th>Costs (€)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Open (n=1678)</td>
<td>f/b EVAR (n=268)</td>
</tr>
<tr>
<td>Para / Juxtarenal</td>
<td>14,907 €</td>
<td>34,425 €</td>
</tr>
<tr>
<td>Type IV TAAA</td>
<td>17,530 €</td>
<td>37,927 €</td>
</tr>
<tr>
<td>Type I-II-III TAAA</td>
<td>44,163 €</td>
<td>54,710 €</td>
</tr>
</tbody>
</table>

Conclusions:
"However, it offers an attractive option .... for patients with supradiaphragmatic TAAA, including patients fit for open surgery."

Michel et al. WINDOW Trial partecipants Eur J Vasc Endovasc Surg 2015
Conclusion

Proximal-AAA: 

... complex pathological entity
Conclusion

Proximal-AAA:

... complex pathological entity

... SC clamping shows ↑ MAE
Conclusion

Proximal-AAA:

... complex pathological entity

... SC clamping shows ↑ MAE

... requires a 4Fen stent-graft in more than 60% of cases
Open repair of proximal abdominal aneurysms classified according to the equivalent fenestrated endovascular treatment

Alessandro Grandi
Vascular Surgery, “Vita-Salute” - San Raffaele University Scientific Institute Ospedale San Raffaele, Milan – Italy
Chief: Prof. R. Chiesa