Early bi- and three-dimensional aneurysm sac variation in predicting long-term EVAR results

Nunzio Montelione

Vascular Surgery Unit, Campus Bio-Medico University Hospital, Rome
Chief. Prof. Francesco Spinelli
Disclosure

Speaker name:
Nunzio Montelione

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
Aim

Evaluate the impact of bi- and three-dimensional preoperative morphologic features and their immediate post-operative variations on the outcome of elective AAAs treated by standard EVAR procedures.
Materials and methods

Bi- and three-dimensional Criteria

Preoperative and 1-month CTA

- Aneurysm diameter (AD)
- Aneurysm volume (AV)
- Δ diameter (%)
- Δ volume (%)
Primary technical success
(successful implantation of a stent graft in the absence of surgical conversion, intraoperative mortality, type I or III endoleaks, and stent graft migration, or occlusion at completion angiography)

30-day, 1-year, and mean FU re-intervention, all-cause, and AAA-related mortality rates
(complications requiring re-intervention: type I or III endoleaks, type II endoleaks with sac enlargement > 5 mm, and graft or access vessel occlusion)
## Demographic data and risk factors

### 333 Pts from September 2012 and September 2017

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>333 Pts</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean, SD)</td>
<td>73.9 (±7.7 years)</td>
<td></td>
</tr>
<tr>
<td>Male Sex</td>
<td>303</td>
<td>91</td>
</tr>
<tr>
<td>Hypertension</td>
<td>285</td>
<td>85.6</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>252</td>
<td>75.7</td>
</tr>
<tr>
<td>Diabetes</td>
<td>46</td>
<td>13.8</td>
</tr>
<tr>
<td>CAD</td>
<td>46</td>
<td>13.8</td>
</tr>
<tr>
<td>Smoke</td>
<td>218</td>
<td>65.6</td>
</tr>
<tr>
<td>COPD</td>
<td>84</td>
<td>25.2</td>
</tr>
<tr>
<td>CRI</td>
<td>87</td>
<td>26.1</td>
</tr>
<tr>
<td>PVD</td>
<td>37</td>
<td>11.1</td>
</tr>
</tbody>
</table>
# Stent-grafts

<table>
<thead>
<tr>
<th>Stent-graft Type</th>
<th>Number of Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excluder and C3 (W.L. Gore &amp; Associates)</td>
<td>123</td>
<td>36.9</td>
</tr>
<tr>
<td>Endurant I and II (Medtronic Inc)</td>
<td>57</td>
<td>17.1</td>
</tr>
<tr>
<td>Zenith LP and Alpha (Cook Medical)</td>
<td>54</td>
<td>16.3</td>
</tr>
<tr>
<td>Ovation (Endologix)</td>
<td>45</td>
<td>13.5</td>
</tr>
<tr>
<td>AFX (Endologix)</td>
<td>28</td>
<td>8.4</td>
</tr>
<tr>
<td>Treovance (Bolton Medical)</td>
<td>12</td>
<td>3.6</td>
</tr>
<tr>
<td>Incraft (Cordis Corp)</td>
<td>12</td>
<td>3.6</td>
</tr>
<tr>
<td>Anaconda (Vascutek/Terumo)</td>
<td>2</td>
<td>0.6</td>
</tr>
</tbody>
</table>
Early results

Primary technical success was achieved in all cases.
No in-hospital mortality was recorded in the present series.

At 30-day
re-intervention was required in 7 pts (2.1%)
and 3 pts died (0.9%) without AAA-related deaths.
Long-term results

Mean follow-up period was **34.9 months ±24.3** (12–83)

Overall **re-intervention** rates were **12.0% (n=40)**

**Mortality** rates were **7.2% (n=24)**

**Without AAA-related deaths** during the entire study period
# Re-interventions

Re-intervention for EL were **62.5% (25/40)**

<table>
<thead>
<tr>
<th></th>
<th>Reinterventions</th>
<th>Treatment</th>
</tr>
</thead>
</table>
| **30-day**  
**n=7**         | 1 Femoral pseudoaneurysm  
1 Partial renal occlusion  
2 Limb occlusion         | Surgical repair  
Renal stenting  
Fibrinolysis and limb stentina |
| **Type IA EL**  
**8 (2.4%)**     | 1 Type IB EL                                                                  | IIiAc extension                                |
| **1-year**  
**n=10**         | 2 Limb occlusion  
1 Bilateral limb occlusion  
3 Type II EL            | Fibrinolysis and limb stenting  
Fibrinolysis + Fem-fem bypass  
1 ARA and lumbar aa. Glue embolization |
| **Type II EL**  
**13 (3.9%)**    | 1 Type IB EL                                                                  | Thoraco-abdominal open repair                  |
| **Long-term**  
**n=23**         | 2 Type IB EL  
5 Type IA EL  
10 Type II EL          | Limb extension  
2 Open conversion  
3 Proximal cuff + RAAAs chimney  
2 Semiconversion  
6 Translumbar sac glue embolization |
| **Open Coversion**  
**4 (1.2%)**     | 1 Limb stenosis  
1 Type III EL            | Fogarty and limb stenting  
Limb stenting  
Limb relining |
Bi- and three-dimensional results

@ Preoperative CT scan
- Mean Aneurysm Diameter 50.4 mm ± 11.8 (43.1-91.8 mm)
- Mean Aneurysm Volume 112.9 cm³ ± 79.5 (39.7-574.3 cm³)

@ 1 month CT scan
- Mean Aneurysm diameter 49.1 mm ± 12.1 (35-95.8 mm)
- Mean Aneurysm volume 112.1 cm³ ± 80.5 (29.3-568.4 cm³)

Following previously experiences cut-off values for analysis were:
- AAA Diameter >59 mm
- AAA Volume >159 cm³

Bi- and three-dimensional results

Mean bi- and three-dimensional variations:

- $\Delta_{\text{diameter}} = 2.4\% \pm 8.0 \ (\text{-27.2} \ - \ +32.9)$
- $\Delta_{\text{volume}} = 1.0\% \pm 12.4 \ (\text{-75.3} \ - \ +45.6)$

For both $\Delta$, a negative value indicating a postoperative increase in diameter and/or volume was taken as threshold for the present analysis.
## Bi- and three-dimensional results

<table>
<thead>
<tr>
<th></th>
<th>Diameter</th>
<th>Volume</th>
<th>-Δ diameter 1 month</th>
<th>-Δ volume 1 month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt;59 mm</td>
<td>&gt;159 cm³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reinterventions</td>
<td>p=0.04</td>
<td>p=0.004</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>OR:2.08</td>
<td>OR:2.87</td>
<td>OR:4.71</td>
<td>OR:5.80</td>
</tr>
<tr>
<td></td>
<td>CI95%=0.99-4.37</td>
<td>CI95%=1.34-6.13</td>
<td>CI95%=2.24-9.81</td>
<td>CI95%=2.52-13.31</td>
</tr>
<tr>
<td>Deaths</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Reinterventions and</td>
<td>p&lt;0.01</td>
<td>p&lt;0.004</td>
<td>p&lt;0.007</td>
<td>p=0.001</td>
</tr>
<tr>
<td>deaths</td>
<td>OR:2.21</td>
<td>OR:2.58</td>
<td>OR:2.18</td>
<td>OR:2.37</td>
</tr>
<tr>
<td></td>
<td>CI95%=1.18-4.15</td>
<td>CI95%=1.33-5.02</td>
<td>CI95%=1.22-3.89</td>
<td>CI95%=1.40-4.01</td>
</tr>
</tbody>
</table>
Bi- and three-dimensional results

Diameter (59 mm)

Volume (159 mm$^3$)
Bi- and three-dimensional results

Δ diameter

Δ volume
Conclusions

Preoperative aneurysm diameter and volume could predict the outcome of EVAR.

The increase of postoperative aneurysm diameter and volume are strongly associated with a significantly greater risk of re-intervention during FU.

These findings could highlight a subpopulation of patients at risk of complications that deserve a closer follow-up.

...Or reducing the need for unnecessary control in those with immediate aortic remodelling, potentially reducing costs and radiation exposure.
Early bi- and three-dimensional aneurysm sac variation in predicting long-term EVAR results

Nunzio Montelione

Vascular Surgery Unit, Campus Bio-Medico University Hospital, Rome
Chief. Prof. Francesco Spinelli