A meta-analysis of safety and efficacy of EVAR in aneurysm patients with angulated and hyperangulated neck

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Disclosure

Speaker name:

.................................................................

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
Definition of hostile neck

- Aortic neck length < 10 mm
- Aortic neck angulation > 60°
- Aortic neck diameter > 28 mm
- Conical neck (> 10% diameter compared to infrarenal diameter)
- Circumferential calcification (> 50%)

Severe infrarenal angulation: Consequences

- Demanding implantation
- IA Endoleak
- Migration
Meta-analysis on severe infrarenal angulation

• Systematic review with meta-analyses
• Registered in International Prospective Registry of Systematic Reviews
• Severe neck angulation (≥60°) versus non-severe neck angulation (<60°)
• Exclusion: dissection, rupture, mycotic, fenestrated/branched EVAR, CHEVAR
Flow chart

Records identified (n = 445)

Full text assessed for eligibility (n = 142)

Included in the meta-analysis (n = 6)

Reason for exclusion
- Full text not available in English (n = 15)
- Wrong study design (n = 14)
- No control group (n = 75)
- < 5 patients analyzed (n = 6)
- Doubling study population (n = 16)
- Review or commentary (n = 10)

### Characteristics of included studies

<table>
<thead>
<tr>
<th>Study</th>
<th>SNA/NSNA</th>
<th>Mean FU (years)</th>
<th>NOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinsakchai, 2020</td>
<td>54/144</td>
<td>4,5</td>
<td>6</td>
</tr>
<tr>
<td>Hobo, 2007</td>
<td>1152/4031</td>
<td>1,5</td>
<td>7</td>
</tr>
<tr>
<td>Le, 2016</td>
<td>34/38</td>
<td>1,5</td>
<td>6</td>
</tr>
<tr>
<td>Malas, 2017</td>
<td>151/67</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Murray, 2020</td>
<td>21/179</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Oliveira, 2018</td>
<td>45/65</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>
Endoleak type 1A at 30 days (4% vs 1.8%)
Endoleak 1A at 1 year (2.8% vs 1.9%; p<0.03)
Neck-related secondary procedures at 30 days
3.8% vs. 2.8% n.s.

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Angulated neck</th>
<th>Non-angulated neck</th>
<th>Odds Ratio</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events</td>
<td>Total</td>
<td>Weight</td>
<td>M-H, Random, 95% CI</td>
</tr>
<tr>
<td>Chinsakchai, 2020</td>
<td>16</td>
<td>54</td>
<td>38.5%</td>
<td>5.09 [2.18, 11.89]</td>
</tr>
<tr>
<td>Hobo, 2007</td>
<td>36</td>
<td>1152</td>
<td>45.4%</td>
<td>1.21 [0.82, 1.77]</td>
</tr>
<tr>
<td>Le, 2016</td>
<td>1</td>
<td>34</td>
<td>16.0%</td>
<td>0.55 [0.05, 6.30]</td>
</tr>
<tr>
<td>Malas, 2017</td>
<td>0</td>
<td>151</td>
<td></td>
<td>Not estimable</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>1391</td>
<td>4280</td>
<td>100.0%</td>
<td>1.85 [0.56, 6.16]</td>
</tr>
</tbody>
</table>

Total events: 53
Heterogeneity: Tau² = 0.79; Chi² = 9.87, df = 2 (P = 0.007); I² = 80%
Test for overall effect: Z = 1.00 (P = 0.32)
More neck-related secondary procedures at 1 and 3 years
Migration at 30 days (higher but ns)

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Angulated</th>
<th>Non-angulated</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hobo, 2007</td>
<td>18</td>
<td>32</td>
<td>1.98 [1.11, 3.55]</td>
</tr>
<tr>
<td>Le, 2016</td>
<td>0</td>
<td>0</td>
<td>Not estimable</td>
</tr>
<tr>
<td>Malas, 2017</td>
<td>0</td>
<td>0</td>
<td>Not estimable</td>
</tr>
<tr>
<td>Murray, 2020</td>
<td>0</td>
<td>0</td>
<td>Not estimable</td>
</tr>
<tr>
<td>Oliveira, 2018</td>
<td>1</td>
<td>2</td>
<td>0.72 [0.06, 8.14]</td>
</tr>
</tbody>
</table>

Total (95% CI): 1403/4380 = 100.00%  Odds Ratio: 1.88 [1.07, 3.30]

Total events: 19/34

Heterogeneity: Tau^2 = 0.00; Chi^2 = 0.64, df = 1 (P = 0.42); I^2 = 0%

Test for overall effect: Z = 2.18 (P = 0.03)
Migration at 1 year (higher but ns)

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Angulated Events</th>
<th>Total</th>
<th>Non-angulated Events</th>
<th>Total</th>
<th>Weight</th>
<th>Odds Ratio (M-H, Random, 95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hobo, 2007</td>
<td>56</td>
<td>944</td>
<td>142</td>
<td>3302</td>
<td>98.9%</td>
<td>1.40 [1.02, 1.93]</td>
</tr>
<tr>
<td>Malas, 2017</td>
<td>2</td>
<td>114</td>
<td>0</td>
<td>51</td>
<td>1.1%</td>
<td>2.29 [0.11, 48.53]</td>
</tr>
<tr>
<td>Murray, 2020</td>
<td>0</td>
<td>21</td>
<td>0</td>
<td>179</td>
<td>Not estimable</td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>1079</strong></td>
<td><strong>3532</strong></td>
<td><strong>100.0%</strong></td>
<td></td>
<td></td>
<td><strong>1.41 [1.03, 1.94]</strong></td>
</tr>
</tbody>
</table>

Total events: 58 / 142

Heterogeneity: Tau² = 0.00; Chi² = 0.10, df = 1 (P = 0.75); I² = 0%

Test for overall effect: Z = 2.13 (P = 0.03)
Other outcomes

• Aneurysm rupture
  • No significant differences
• Aneurysm related mortality
  • No significant differences
• All-cause mortality
  • No significant differences
Discussion

• High heterogeneity (different devices)
• 1 cohort study counting >80% of the study population
• Other parameters of hostile neck were not considered
Conclusions

• Higher incidence of Type 1A endoleak and neck-related secondary procedures in hyperangulated necks

• No differences regarding aneurysm rupture or aneurysm related mortality

• More studies with longer follow-up are necessary
Thank you!
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