MANAGEMENT OF ASYMPTOMATIC THROMBUS INSIDE ENDOGRAFTS AFTER EVAR: SHOULD WE TREAT OR NOT

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Disclosures
- Medtronic
- WL Gore
- Philips
- Endologix

Mural thrombus in abdominal aortic endografts

Should we be concerned?

Does it lead to...

Thrombus in aortic endografts

- 19 to 33% of abdominal aortic endografts
- This has been associated with Limb thrombosis and occlusion. However, the evidence for this is scarce and potentially biased.
- Optimal strategy is unknown
  - Conservative or re-lining
  - Intensification of imaging surveillance
  - Oral anticoagulation
- Need for further evidence to support either strategy

Mural thrombus in abdominal aortic endografts

Hypothesis
- Endograft mural thrombus is not associated with thromboembolic events
**Mural thrombus in abdominal aortic endografts**

**Methods**
- Retrospective case-control
- Prospective database, 1 high volume center
- 2000-2012 – 414 EVAR patients for degenerative AAA
- CTA - Center lumen line reconstruction

**Study group – 68 patients**
- > 2mm of maximum thickness
- > 25% main-body circumference
- > 3mm longitudinal extension

**Control group - 346**

**Statistical analysis**
- Pearson $\chi^2$ – categorical variables
- Mann-Whitney / Student’s T-Test – continuous variables
- Survival estimates – Kaplan-Meier method
- Cox proportional hazard – univariate analysis

**Results**

**Baseline clinical characteristics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Thrombus (N=68)</th>
<th>No Thrombus (N=346)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>69.3 ±13.9</td>
<td>72.3 ±7.5</td>
<td>.051</td>
</tr>
<tr>
<td>Male gender</td>
<td>59 (86.8)</td>
<td>312 (90.2)</td>
<td>.400</td>
</tr>
<tr>
<td>Smoking</td>
<td>49 (72.1)</td>
<td>221 (63.9)</td>
<td>.166</td>
</tr>
<tr>
<td>Cardiac status ≥2</td>
<td>14 (20.6)</td>
<td>62 (17.9)</td>
<td>.563</td>
</tr>
<tr>
<td>Hypertension</td>
<td>48 (70.6)</td>
<td>217 (62.7)</td>
<td>.338</td>
</tr>
<tr>
<td>ASA class III/IV</td>
<td>34 (50.0)</td>
<td>165 (47.7)</td>
<td>.738</td>
</tr>
<tr>
<td>Baseline eGFR, mL/min/1.73m</td>
<td>72.5 (60.8 – 87.6)</td>
<td>76.5 (60.8 – 87.6)</td>
<td>.456</td>
</tr>
<tr>
<td>Postoperative eGFR mL/min/1.73m</td>
<td>70.1 (51.3-86.4)</td>
<td>72.1 (54.2-88.3)</td>
<td>.659</td>
</tr>
<tr>
<td>Oral anticoagulation</td>
<td>7 (10.3)</td>
<td>50 (14.5)</td>
<td>.237</td>
</tr>
<tr>
<td>Elective EVAR</td>
<td>56 (82.4)</td>
<td>270 (78)</td>
<td>.426</td>
</tr>
</tbody>
</table>

**Freedom from thromboembolic events**

- Median follow-up: 3.5 years (IQR 2.0-5.5)
- Overall events: 17 patients (4.1%)
- Study group (4.4%)
- 3 limb occlusions
- Control group (4.1%)
- 2 AUI occlusions
- 12 limb occlusions

**Timing of ingraft thrombus detection**

- 30-day: 17.6%
- 1 year: 36.7%
- 2 year: 12.2%
- 3 year: 32.4%

**Morphological variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted OR</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck thrombus ≥ 25%</td>
<td>1.80</td>
<td>1.10-3.21</td>
<td>.020</td>
</tr>
<tr>
<td>Neck calcification ≥ 25%</td>
<td>1.06</td>
<td>0.69-1.57</td>
<td>.908</td>
</tr>
<tr>
<td>Neck diameter ≥30 mm</td>
<td>2.36</td>
<td>1.31-4.23</td>
<td>.004</td>
</tr>
<tr>
<td>Baseline suprarenal angle ≥30°</td>
<td>1.86</td>
<td>0.83-3.93</td>
<td>.166</td>
</tr>
<tr>
<td>Baseline infrarenal angle ≥30°</td>
<td>0.70</td>
<td>0.34-1.41</td>
<td>.348</td>
</tr>
<tr>
<td>Postoperative suprarenal angle ≥30°</td>
<td>1.16</td>
<td>0.54-2.57</td>
<td>.666</td>
</tr>
<tr>
<td>Postoperative infrarenal angle ≥30°</td>
<td>1.44</td>
<td>0.77-2.71</td>
<td>.258</td>
</tr>
</tbody>
</table>

*Multivariate regression analysis including most significant variables on univariate analysis.
### Results

#### Device-related variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted HR*</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variation of main-body cross-sectional area ≥50%</td>
<td>6.92</td>
<td>1.69-28.31</td>
<td>.007</td>
</tr>
<tr>
<td>AUI graft configuration</td>
<td>2.20</td>
<td>1.88-5.49</td>
<td>.050</td>
</tr>
<tr>
<td>Polyester fabric</td>
<td>3.98</td>
<td>2.17-7.29</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Metal landing zone EIA</td>
<td>1.34</td>
<td>0.37-5.08</td>
<td>.691</td>
</tr>
</tbody>
</table>

*Multivariate regression analysis including most significant variables on univariate analysis.

#### Mural thrombus in abdominal aortic endografts

**Conclusions**

- Ingraft mural thrombus is multifactorial
  - Clinical characteristics
    - Baseline thrombus load in the proximal aneurysm neck
    - Larger proximal aneurysm necks
  - Device-related features
    - AUI devices
    - Polyester fabric
  - Geometric conformation
    - Main-body barrel-like configuration

- Ingraft mural thrombus formation was not associated to an increase of thromboembolic events
- Anticoagulation for asymptomatic endograft thrombosis can not be supported
- Standard CTA-based follow-up seems to be appropriate

**Thank you**
Mural thrombus in abdominal aortic endografts

Background

Thrombus is a fairly frequent phenomenon, but its true significance remains unknown at the present time. Some patients may experience regression and healing of observable thrombotic deposits with specific therapy.

Conclusions

Integrating thrombus formation was a common finding during follow-up of abdominal aortic endografts, particularly in aneurysms with large mural thrombi of the native aorta, and is associated with the use of endovascular endografts. The area occupied by the mural thrombus was shown to gradually increase during follow-up and was associated with a greater tendency for endograft occlusion.