How MR Evaluated Mural Thrombus In AAAs Associated With Predicting Their Growth Rates

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Disclosures
• None

Background
The role of the intraluminal thrombus (ILT) in AAA has not yet been fully understood

1. Mechanically protective
2. Biologically involved in the degradation

But are all thrombi, all the same?
CT-angiography, Macroscopic, MR scan
Are there any additional bio-information available here?

Aims
• To describe the prevalence and morphology of ILT in AAA
• To associate it with its retrospective growth rate
• Using the screening cohort from the Viborg Vascular (VIVA) screening trial

Methods and material
• Inclusion criteria:
  • Reliable growth rate estimation due to +2 year surveillance and same US scanner and observer
  • Living in Viborg or a surrounding community
• Material
  • 46 of 72 eligible from the VIVA trial*
  • All underwent a non-contrast-enhanced MRI.

Semi-qualitative classification before analysis

1. No thrombus
2. Homogeneous ILT
3. Heterogeneous ILT with circular composition
4. Heterogeneous ILT with polymorph composition
5. Peripheral ILT (note the flow artifact)

First by overall review by CBR and JSL
Secondly, independent classification of all cases
Disagreements by consensus (n=6)

Bright luminal border diameter

- A bright luminal border zone could be seen on virtually all present ILT’s on the T2 weighted sequences, but of different thickness.
- The width of this zone was measured at the max AP distance, at the point of where the zone was at its thickest.

Results

- Mean growth rate was 1.96 mm/year
  [SD: 0.87, range: 0.41 - 4.28 mm/year]
- Mean observation time was 5.51 years
  [SD: 0.84, range: 2.08 - 7.21 years]  
- Baseline AAA mean maximal AP diameter measured with US was 32.3 mm
  [SD: 4.60, range: 30-49 mm]  
- Prior to the MRI had grown to 42.7 mm
  [SD: 5.72, range: 30-54 mm]

Multivariate analysis

<table>
<thead>
<tr>
<th>Thrombus category</th>
<th>Growth rate (mm/year)</th>
<th>β-coefficient</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 No-thrombus</td>
<td>0.96</td>
<td>0.08</td>
<td>0.19</td>
</tr>
<tr>
<td>2 Homogeneous</td>
<td>1.64</td>
<td>1.64</td>
<td>0.01</td>
</tr>
<tr>
<td>3 Heterogeneous</td>
<td>1.42</td>
<td>1.42</td>
<td>0.01</td>
</tr>
<tr>
<td>4 Heterogeneous polymorph</td>
<td>1.23</td>
<td>1.23</td>
<td>0.01</td>
</tr>
<tr>
<td>5 Peripheral thrombus</td>
<td>7.24</td>
<td>7.24</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Subgroup test of +ILT:
No difference between the thrombus groups – but the numbers are small

The bright luminal zone

The maximal thickness of the luminal “liner” was introduced into the regression model instead of the thrombus categories
Significance persisted, but the positive coefficient were small and in clinical settings probably not that important.

Conclusion - Discussion

Discrimination - Design

- Small groups
- Selection bias
- Residual confounding
- Historical cohort study
- Explorative study
- Hypothesis generating
- Needs confirmation

- T2 MR scans shows different morphologies of the mural thrombus
- Presence of the thrombus is associated with increased historical growth rate
- But no differences between the five morphologies could be shown
Same polymorphism in ultrasonography?