Endovascular treatment of the ascending aorta – are there indications?

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Disclosure

Speaker name: Hans Krankenberg

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
Endovascular interventions - ascending aorta
1995 - 2017

Systematic review, 46 publications, 118 patients

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Systematic review, 46 publications, 118 patients

<table>
<thead>
<tr>
<th>Access</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>femoral</td>
<td>63%</td>
</tr>
<tr>
<td>transapical</td>
<td>14%</td>
</tr>
<tr>
<td>A. carotis</td>
<td>13%</td>
</tr>
<tr>
<td>axillary</td>
<td>7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complications (FU Ø 17 months)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Typ I Endoleak</td>
<td>19%</td>
</tr>
<tr>
<td>Reintervention</td>
<td>9%</td>
</tr>
<tr>
<td>Conversion to surg.</td>
<td>3%</td>
</tr>
<tr>
<td>Cerebrovasc. compl.</td>
<td>3%</td>
</tr>
<tr>
<td>Mortality</td>
<td>15%</td>
</tr>
<tr>
<td>Aorta</td>
<td>5%</td>
</tr>
</tbody>
</table>

Indication for grafts

• Lesions post surgery:
  • Pseudoaneurysm
  • Postsurgery bleeding
  • Residual Dissection
  • Lost TAVI

• Ascending aneurysm

• Type A dissection
10 - 30% of patients are not accepted for surgery

**TEVAR** is an additional option in 30 to 50% of the patients

Nienaber et al. 2017
### Consensus EACTS/ESVS

**Recommendation**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TEVAR in zone 0</strong> after previous debranching <strong>may be considered</strong> in patients unfit for open repair and suitable anatomy.</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td><strong>TEVAR in zone 1 and 2</strong> should be considered in patients with suitable anatomy.</td>
<td>IIA</td>
<td>B</td>
</tr>
<tr>
<td>Stent-graft deployment in zone 0 is not recommended in patients with a <strong>proximal and/or distal landing zone length less than 25mm</strong> or a maximum diameter of more than 38mm.</td>
<td>III</td>
<td>B</td>
</tr>
</tbody>
</table>

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Eur J Cardiothorac Surg 2019:55 (1) 133-62; Courtesy of Czerny and Schmidli, MAC 2018
Consensus EACTS/ESVS

<table>
<thead>
<tr>
<th>Factors favoring one or the other approach</th>
<th>Endovascular repair</th>
<th>Open repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous CABG with patent IMA graft at risk at resternotomy</td>
<td>V</td>
<td>X</td>
</tr>
<tr>
<td>Poor LV- or RV-function</td>
<td>V</td>
<td>X</td>
</tr>
<tr>
<td>Poor pulmonary function</td>
<td>V</td>
<td>X</td>
</tr>
<tr>
<td>Poor liver function</td>
<td>V</td>
<td>X</td>
</tr>
<tr>
<td>Connective tissue disorder patients with landing zones in native tissue</td>
<td>X</td>
<td>V</td>
</tr>
<tr>
<td>Access vessels (femoral and iliac) diameter &lt; 7mm</td>
<td>X</td>
<td>V</td>
</tr>
<tr>
<td>Native ascending aorta diameter &gt; 38mm</td>
<td>X</td>
<td>V</td>
</tr>
<tr>
<td>Valvular heart disease necessitating concomitant repair</td>
<td>X</td>
<td>V</td>
</tr>
<tr>
<td>Previous mechanical aortic valve replacement</td>
<td>X</td>
<td>V</td>
</tr>
<tr>
<td>Prosthetic ascending aorta short or kinked</td>
<td>X</td>
<td>V</td>
</tr>
</tbody>
</table>
Octogenerian patients after surgery
n=57

Surgical ATAAD Repair
n=49 (ATAAD after cardiac surgery)
n=281 (spontaneous ATAAD)

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Without preoperat. moribunde

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Spontaneous ATAAD

ATAAD after previous cardiac surgery

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Mortality after type A aortic dissection in patients with previous cardiac surgery

- **Mortality**
  - A: Previous surgery (PCS): 14 of 56, No previous surgery (No-PCS): 69 of 573
  - B: Previous CABG: 12 of 38, Previous No-CABG: 2 of 18
  - p = 0.011

- **Survival**
  - Log rank, p = 0.004
  - Patients at risk: 573, No PCS: 56, PCS: 15
  - Time (years): 0, 5, 10

Rylski et al. *Ann Thor Surg* 2014;97:1582-9
Ascending aneurysm – anatomical limitations

- Most are conical
- No proximal landing zone

- Endovascular exclusion usually not possible in native vessel

Kolvenbach et al. 2011; J Vasc Surg 53: 1431-8
Anatomical suitability

Graft geometry

- Undersizing (5% oversizing max.)
- Tapert stent graft (bigger diameter prox.)
- Curved stent graft

Aortic anatomy

- **Aortic sinus/coronary arteries** (suitable: dissection distal to the sinu-tubular junction)
- Supraaortal vessels: possible fenestration/arms
- Consider kinking

Preconditions for TEVAR

30-50% of patients eligible

- No connective tissue disease, no CAD
- Suitable access vessels
- No significant aortic regurgitation
- Entry-tear > 10 mm distal to sino-tubular junction
- Proximal and distal landing zone ≥ 20 mm
- True lumen diameter ≤ 38 mm
- Total lumen diameter ≤ 46 mm

Kolvenbach et al. J Vasc Surg 2011;53;1431-8
Summary

• Endovascular treatment of ascending aorta is potentially beneficial in selected patients.

• Patients older than 80 years and patients with prior cardiac surgery may benefit.

• The anatomy of the ascending aorta has to be matched by dedicated devices.
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