Tips and Tricks to Deliver a Stentgraft to the Ascending Aorta

Tilo Kölbel, MD, PhD

University Heart Center
University Hospital Eppendorf
Hamburg, Germany
Disclosures

* Research-grants, travelling, proctoring, speaking-fees, IP with Cook.
* Research-grant, travelling, speaking-fees with Cordis
* Research-grant, proctoring with Atrium
Clinical Relevance

- Type A Dissection
- Ascending aneurysm
- Re-Do after open surgery
- Adjunct to endovascular arch repair
Type A Dissection: Approachability for Endovascular Repair

Endovascular Approaches to Acute Aortic Type A Dissection: A CT-Based Feasibility Study


Conclusion

Approximately half of the patients currently undergoing open repair of an acute type A dissection could potentially be candidates for an endovascular repair. It is reasonable to extrapolate that the same proportion of patients who currently refused surgery on the basis of being unfit for open repair would have anatomy suitable for an endovascular repair. Clinical studies should be conducted in this subgroup of patients to determine a potential future role of endovascular repair in acute type A dissections.
Endovascular Limitations in the Ascending Aorta

- Distance from transfemoral access
- Length and diameter of endograft
- Tortuosity and kinking
- Left ventricular wire-position
- Hemodynamic forces of the ascending aorta
- Apposition
Distance from Transfemoral Access

- Length of sheath: 75 - 95cm can be too short
- Individual distance on preop-CT
- Conduit access
- Alternative access routes
  - Subclavian
  - Antegrade
## Graft Specifications

<table>
<thead>
<tr>
<th>Brand</th>
<th>Diameter (mm)</th>
<th>Length (mm)</th>
<th>System-Length (mm)</th>
<th>Sheath-Diameter ID (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cook Zenith TX2 ProForm</td>
<td>22-42</td>
<td>77-216</td>
<td>75</td>
<td>20-22</td>
</tr>
<tr>
<td>Medtronic Valiant Captivia</td>
<td>22-46</td>
<td>110-226</td>
<td>88</td>
<td>22-25</td>
</tr>
<tr>
<td>Gore CTAG</td>
<td>21-45</td>
<td>100-200</td>
<td>115</td>
<td>18-24</td>
</tr>
<tr>
<td>Bolton Relay</td>
<td>22-46</td>
<td>100-250</td>
<td>90 + x</td>
<td>22-24</td>
</tr>
<tr>
<td>Jotec Evita 3G</td>
<td>24-44</td>
<td>130-230</td>
<td>95</td>
<td>20-24</td>
</tr>
</tbody>
</table>
Endograft Length and Diameter

- **Length:**
  measure at outer curve 6-10cm

- **Diameter:**
  measure on Centerline

- **Tapered grafts**
  - Reverse tapering

- **On-table customization**
Endograft Length and Diameter

- **Length:** measure at outer curve 6-10cm
- **Diameter:** measure on Centerline
- **On-table customization**
- **Tapered grafts**
## Graft-Specifications

<table>
<thead>
<tr>
<th>Brand</th>
<th>Diameter (mm)</th>
<th>Length (mm)</th>
<th>System-Length (mm)</th>
<th>Sheath-Diameter ID (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cook Zenith TX2 ProForm</td>
<td>22-42</td>
<td>77-216</td>
<td>75</td>
<td>20-22</td>
</tr>
<tr>
<td>Medtronic Valiant Captivia</td>
<td>22-46</td>
<td>110-226</td>
<td>88</td>
<td>22-25</td>
</tr>
<tr>
<td>Gore CTAG</td>
<td>21-45</td>
<td>100-200</td>
<td>115</td>
<td>18-24</td>
</tr>
<tr>
<td>Bolton Relay</td>
<td>22-46</td>
<td>100-250</td>
<td>90 + x</td>
<td>22-24</td>
</tr>
<tr>
<td>Jotec Evita 3G</td>
<td>24-44</td>
<td>130-230</td>
<td>95</td>
<td>20-24</td>
</tr>
</tbody>
</table>
Endograft Length and Diameter

Cook Zenith TBE ProForm

77-81mm
Zenith® Ascend

ZTLP-A

- Type A Dissection
- Low Profile (16-20F)
- 100cm Sheath length
- 28mm – 46mm Diameter
- Length: 65mm/83mm
- Proximal and distal Barestents
- Controlled Deployment: ProForm

Not available, No CE-mark, Not FDA-approved
Zenith® Ascend

Not available, No CE-mark, Not FDA-approved
Zenith® Ascend

Not available, No CE-mark, Not FDA-approved
Tortuosity and Kinking

- Stiff Buddy wire
- Throughwire-access:
  - Transbrachial
  - Transseptal
  - Transapical
- Alternative access routes:
  - transcatheter,
  - subclavian artery
Transapical Through & Through
Transseptal Through & Through
Left ventricular wire-position

- Crossing the aortic valve:
  - Preop echocardiography: AV-stenosis, opening-area
  - Long, soft hydrophilic wire

- Prevent perforation:
  - Stiff double precurved wire
  - Position well into the left ventricle
  - Constant observation
Hemodynamic forces

- Windsocket effect
  - Proximal fixation
  - Throughwire-access
  - Cardiac output reduction

- Pulsatility
  - 15% in the ascending aorta

Kasirajan et al; J Vasc Surg 2010
Hemodynamic forces

- Windsocket effect
  - Proximal fixation
  - Throughwire-access
  - Cardiac output reduction

- Pulsatility
  - 15% in the ascending aorta

- Arch movements
  - Cardiac cycle
  - Breathing
Apposition
Alternative Access Routes

- Subclavian Artery
- Transapical Access
- Transseptal Access
Transsubclavian Access
Transsubclavian Access

- Straight access in mature arches
- May require conduit
- Stroke risk
Transapical Access
Transapical TEVAR

- Short, straight route
- Well established Access
- Cardiac axis
Transapical TEVAR in Acute Type A Dissection
Transapical TEVAR in Acute Type A Dissection
Transapical TEVAR in Acute Type A Dissection
Transapical TEVAR in Acute Type A Dissection

12h postop.
Percutaneous Transapical TEVAR
Transseptal Access
Transseptal TEVAR
Summary

* Stent-graft delivery to the ascending aorta can be challenging because of distance, tortuosity and hemodynamic differences.
* Currently available stent-grafts do not meet requirements.
* Alternative access routes can provide improved control.
* Role of endovascular treatment in the ascending aorta yet to be defined.