Tips and Tricks For Endoanchor Use During TEVAR: When Are They Indicated

VEITH Symposium 2015
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Endoleaks happen
Even with optimal planning
Even with current stent-graft technologies

Endoleak management and postoperative surveillance following endovascular repair of thoracic aortic aneurysms
Joseph J. Ravits, MD, Dallas, TX

ENDOLEAK CLASSIFICATION
An endoleak is defined as blood flow outside of the endograft lumen and within the aneurysm sac. A classification system for endoleaks has been created for endoleaks after both EVAR and TEVAR, according to the source of blood flow entering the sac. An endoleak may be further classified according to the timing of its appearance. The highest risk of progression of TAA (thoracic aortic aneurysm) after EVAR/TEVAR is an endoleak.

Table 1. Shunt endoleak rate in thoracic endovascular aortic repair

<table>
<thead>
<tr>
<th>Patient</th>
<th>TAAA</th>
<th>TAAI</th>
<th>Type I</th>
<th>Type II</th>
<th>Type III</th>
<th>Type IV</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>94</td>
<td>82</td>
<td>8</td>
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<td>185</td>
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Disclosures

Bolton Medical
Lombard Medical
Medtronic
TriVascular

Challenges in TEVAR

- High anatomical variations
- Manipulations near or at coverage of critical branches
- Risk of neurologic complications or mesenteric ischemia
- Larger devices in smaller anatomy
- Higher rate of failures
- Beat-to-beat movement
- Risk of migration/leak
- Progression of TAA
Securing Endografts in the Thoracic Aorta

- Dynamic environment
- Difference in compliance of aorta
- Pulsating forces
  - Longitudinal
  - Lateral
  - Rotational

Re-interventions after TEVAR Remain High

<table>
<thead>
<tr>
<th>Re-intervention Indication</th>
<th>Overall Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I endoleak</td>
<td>8.3%</td>
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<tr>
<td>Type II endoleak</td>
<td>1.5%</td>
</tr>
<tr>
<td>Subclavial steal syndrome</td>
<td>1.5%</td>
</tr>
<tr>
<td>Endograft compression/collapse</td>
<td>1.1%</td>
</tr>
<tr>
<td>Aortobronchial/esophageal fistula</td>
<td>1.1%</td>
</tr>
<tr>
<td>Type III endoleak</td>
<td>0.4%</td>
</tr>
<tr>
<td>Endograft infection</td>
<td>0.4%</td>
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</tbody>
</table>

Major indication for re-intervention is Type I EL

- 8.3% Type I endoleak related re-interventions

EndoAnchors in TEVAR

Bringing the stability of surgical anastomosis to TEVAR

- 4 EndoAnchors implanted in outer & inner radius of proximal neck

Primary TAA with Short/Angled Proximal Neck

Revision – TAA Proximal Type 1 endoleak

Multiple Deflection Lengths for Varying Neck Diameters
Mural thrombus >2mm thick and 180º of circumference
Porcelain aorta (severe circumferential calcification)
Loss of graft apposition with resulting gap
Attaching endograft layers without aortic wall penetration

Early Published European TEVAR Experience

- Kasprzak et al. used EndoAnchors to repair incomplete sealing and non-alignment of TAA/TAAA grafts
  - 4 pts - revision setting
  - 2 pts - primary setting for acute complications
  - Indications: type Ia/Ib, graft migration, graft infection
- EndoAnchor implantation and fixation successful in all patients
- No EndoAnchors misdeployed
- No other adjunctive maneuvers needed after EndoAnchors
- Favorable follow-up in mean 11-month
  - No stent-graft migration, type I endoleak or EndoAnchor dislocation observed

TEVAR + Endoleaks

Treatment

Prevention

“Commit to the curve”
Why Endostapling in this Case?

Preventive
- "Gothic Arch"
- Type III arch
- Short proximal neck
- Avoid "windsocking" of graft while ballooning proximal neck
- Prevent graft migration
- Prevent neck dilation?

EndoAnchor Clinical Experience in TEVAR

>200 total TEVAR cases with EndoAnchors since June-2013 launch
- Majority cases in Primary setting
- No reported late Anchor Dislocations, Fractures or Fistula
- Hostile necks in Primary and Type I endoleaks in Revision are most common cited reasons for EndoAnchoring

<table>
<thead>
<tr>
<th>PRIMARY SETTING</th>
<th>REVISION SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reason</strong></td>
<td><strong>Frequency</strong></td>
</tr>
<tr>
<td>Short neck</td>
<td>47.9%</td>
</tr>
<tr>
<td>Angulated neck</td>
<td>15.5%</td>
</tr>
<tr>
<td>Wide neck</td>
<td>15.5%</td>
</tr>
<tr>
<td>Conical neck</td>
<td>12.7%</td>
</tr>
<tr>
<td>Acute type 1</td>
<td>8.0%</td>
</tr>
<tr>
<td><strong>Reason</strong></td>
<td><strong>Frequency</strong></td>
</tr>
<tr>
<td>Late type 1</td>
<td>63.2%</td>
</tr>
<tr>
<td>Migration</td>
<td>21.1%</td>
</tr>
<tr>
<td>Neck dilation</td>
<td>15.8%</td>
</tr>
</tbody>
</table>

EndoAnchors: When to Consider?

Severe Angulation
Difficult landing
Hostile Necks

Primary
Revision

Migration/Type I Leak
Birdbeaking

65-year-old white male
Prior open AAA repair
6.5 cm aneurysm of lower descending thoracic aorta
5cm aneurysm of proximal descending thoracic aorta

Case images courtesy of P Kasprzak MD, Regensburg and JM Panneton, Eastern Virginia Medical Lower image from R. Kolvenbach et al. J Vasc Bras. 2009;8(4) Type 1 Leak image courtesy of A Papavoine MD, Symposium EndoAnchoring image from Thakkar et al. JVS 2011:53
Conclusions

- Strong need for EndoAnchors in TEVAR
  - Addresses major cause of complications by potentially reducing neck dilatation and realignment risks
  - Treats seal complications and may mitigate risk of further complications
  - Provides a solution for challenging anatomy and often compromised seal zones
  - Clinical experience (>200 pts) confirms EndoAnchor use is safe
  - No reported late anchor dislocations, fractures or fistula
  - Preliminary results show promise in preventing and treating seal-related complications

- Tips and Tricks For Endoanchor Use During TEVAR: When Are They Indicated

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