What are the advantages using endoanchors in TEVAR?

Disclosures (grants, speaker fee, development, patents):
Cook, Gore, Vascutek, Bard, Medtronic, Maquet, Philips, UCB
All components are extensively tested against the high standards

- Fatigue Resistance / pulsatile fatigue
- Graft material: strength / abrasio porosity
- Stent fracture: Longitudinal fatigue testing
- Pullout force / migration resistance
- Radial force / Device Stability / Kink resistance
Subtotal stent graft collapse at the level of the distal aortic arch after unsuccessful proximal stent graft extension and primary treatment for traumatic aortic rupture (A). Successful secondary attachment of the proximal aortic extension stent graft to the inner curvature of the distal aortic arch using 7 endostaples (insert with black arrows, B).
Proximal Migration / Dislocation after 1 Year
Partial debranching for descendens aneurysm

Endoleak Ia after 6 months

Arch stent graft with scalop

Cook ®
Fixation with 3 helical endostaples (arrow) and thoracic stent graft extension for secondary treatment of a thoracic aortic aneurysm with a distal type Ib endoleak (insert with white arrows showing 2 endostaples).
Complications after TEVAR

- Aneurysm expansion, - rupture
- Endoleak Type Ia/b, II, III
- Migration
- Stent graft protrusion = coarctatio, infolding, collapse
- Side branch occlusion / organ dysfunction, ischemia
- Intraluminal thrombosis
- Spinal ischemia
- Aortic dissection
- Stent graft infection
- Complications of the groin / iliacs
EndoAnchoring for TEVAR

Problems at the Sealing Zone:

- Short neck / kinking
- Stent graft nonalignment
- Type I a/b Endoleak
- Migration
- Stent graf protrusion / Infolding

Proximal ‘convex’ Descendens Aneurysm

Possible solution: EndoAnchoring?

First EndoAnchors in TEVAR worldwide on 23.03.2011
The use of EndoAnchors to rescue complicated TEVAR procedures

Sarah B. ONGSTAD 1, Daniel F. MILLER 1, Jean M. PANNETON 1, 2, *

1Vascular Surgery Department, Eastern Virginia Medical School, Norfolk, VA, USA. 2Division of Vascular Surgery, Sentara Heart Hospital, Norfolk, VA, USA

Figure 10.—Freedom from endoleak.
*Kaplan-Meier curve demonstrating 92% freedom from post-operative endoleak requiring reintervention at up to 12 months following the index procedure. Number of patients at risk is indicated in the x-axis.
Figure 11.—Freedom from aortic-related reintervention.
*Kaplan-Meier curve demonstrating 81% freedom from aortic-related reintervention at up to 12 months following the index procedure. Number of patients at risk is indicated in the x-axis.

Figure 12.—Freedom from aortic-related death.
*Kaplan-Meier curve demonstrating 90% freedom from aortic-related death at up to 12 months following the index operation. Number of patients at risk is indicated in the x-axis.
Stentgraft migration with RTAA after partial Debranching
Stentgraft migration with RTAA after partial Debranching proximal Stentgraft-Extension
Proximal EndoAnchorong of the TEVAR with Scalop for Brachiocephalic Trunk and Fenestration for the left CCA in Patient with Multibranched Stentgraft for Type II TAAA
Fenestrated TEVAR / BEVAR
Migration of Fenestrated (LSA) TEVAR in BEVAR for TAAA
EndoAnchors – De Novo Indication takes Over

Department of Vascular and Endovascular Surgery
University of Regensburg 2011 – 2016

Endoanchors in 116 Patients with EVAR, TEVAR, FEVAR and BEVAR

Age 70 (±10) 42-88

99 men (mean 69 years)
17 women (mean 75 y.)
Patients

Indication:

University of Regensburg
2011 – 2015

25 Patients with EndoAnchors in TEVAR and F/B EVARs

17 men, 8 women

Age 71 (43 – 88)

Elective 19, ruptured 6

Additional cuff or extension 6

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>%</th>
</tr>
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<tbody>
<tr>
<td>Nonalignment, Endoleak I a-b</td>
<td>10</td>
<td>40</td>
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<tr>
<td>Hostile neck</td>
<td>7</td>
<td>28</td>
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<tr>
<td>Stent graft protrusion</td>
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<td>8</td>
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<tr>
<td>Partial stentgraft collaps</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Migration +side branch malperfusion</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Non alligment</td>
<td>3</td>
<td>12</td>
</tr>
</tbody>
</table>
Value of EndoAnchors in Complex TEVARs and F / BEVARs

Perioperative results:

- Technical success 25/25 (100 %)
- 3-14 EndoAnchors per patient implanted
- Sheath repositioning in 20-30 %
- 3 anchors lost and retracted
- 1 cerebral embolisation of the left vertebral artery using transaxillar approach during endovascular aortic arch intervention / deceased
Results during FU:

- Follow-up 36 Months (12 - 66)
- no dissection, periaortica hematoma or infection
- 2 Type II endoleaks with stable aneurysm diameter
- 1 Type III endoleak (BEVAR, re-intervention with TEVAR)
- No redo for EndoAnchors
- No aneurysm related mortality
Limitations:

- Lack of apposition between stentgraft and aortic wall

- Primary procedure or endoleak (distance to the aortic wall > 3mm)

- Thick thrombus formation

- Stentgraft underseized (lack of oversising)

Possible solution: Extension Cuff and Endoanchors
Proximal Cuff-Extension with nonalignment and Fixation with EndoAnchors in Patient with Migration and Type Ia Endoleak after multibranched BEVAR
Results during FU:

- Follow-up 36 Months (12 - 66)
- no dissection, periaortal hematoma or infection
- 2 Type II endoleaks with stable aneurysm diameter
- 1 Type III endoleak (BEVAR, reintervention with TEVAR)
- No redo for EndoAnchors
- No aneurysm related mortality

- 1 lost alignment on the proximal stent without endoleak after 3 years
BACKGROUND:
The aim of this study was to report the occurrence of a type IIIb endoleak after endovascular repair of a thoracic aortic aneurysm caused by endoanchor dislocation.

CASE REPORT:
An 84-year-old female patient underwent thoracic endovascular repair for aneurysmal disease of her thoracic aorta. The procedure included primary left subclavian artery revascularization and the placement of endoanchors to enhance fixation of the endograft within the aortic arch. Dislocation of one of the endoanchors resulted in a graft defect leading to a type IIIb endoleak and aortic diameter expansion.

CONCLUSIONS:
Endoanchors represent a promising adjunct in endovascular repair settings. However, their use requires careful procedure planning and special attention during follow-up.
Conclusions:

We consider EndoAnchors for treatment in:

- Nonalignment
- Short neck / kinking
- Prevention of migration / side-branch malperfusion
- Stent graft protrusion
- Partial stent graft collapse
- Typ I endoleak (ev. with Extension-Cuff / Stentgraft) as therapy option with promising results
What are the advantages using endoanchors in TEVAR?

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