Aortic Neck Issues
Associated Clinical Sequelae/Implications for Graft Choice

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  – Consultant & Research grants
• Atrium
  – Consultant
• Siemens
  – Consultant
• Endologix
  – Consultant
Case 1: Failed 2xFEVAR
Partial opening of graft...
Case 2: 4xFEVAR

- 61 YO Male
- AAA 65mm
  - EVAR 4 yrs ago
Plan

• **4x FEVAR**
  – Easy CT and SMA
  – Adequate sealing zone
  – Proximal extension still possible
Case 3: 3xFEVAR

- 65 YO Male
- **Juxtarenal** AAA
  - Dmax: 53 mm
  - Saccular
- Co-morbidity
  - CAD
  - PAD
→ Proximal neck length: 0 or 40 mm?
Plan

- 3x FEVAR
Postop CTA
Case 5: 3xFEVAR (wrong choice)

- 71 YO Male
- 2011
  - Juxtarenal AAA
    - Dmax: 54 mm
- Co-morbidity
  - CAD
→ Proximal neck length: 4-5mm, conical
Problem: Dilated Thoracic Aorta

→ Dmax above Celiac trunk: 36-37mm...
Plan

- 3x FEVAR
3x FEVAR
Postop CTA

36mm
CTA @ 2 years
CTA @ 4 years

44 mm
CTA @ 6 years

45 mm
Treatment Plan

- Redo F/BEVAR
  - 1x ↓ Branch for CA
  - 3x Fenestrations
→ Infrarenal Aortic Neck Dilates after open Surgery
Aortic neck dilatation after endovascular abdominal aortic aneurysm repair: A word of caution

Nicolas Diehm, MD,¹ᵇ Florian Dick, MD,ᶜ Barry T. Katzen, MD,ᵃ Juerg Schmidli, MD,ᶜ Christoph Kalka, MD,ᵇ and Iris Baumgartner, MD,ᵇ Miami, Fla; and Bern, Switzerland

(J Vasc Surg 2008;47:886-92.)

Conflicting- Controversial Data
Aortic neck dilatation after endovascular abdominal aortic aneurysm repair: A word of caution

Nicolas Diehm, MD, a,b Florian Dick, MD, c Barry T. Katzen, MD, a Juerg Schmidli, MD, c Christoph Kalka, MD, b and Iris Baumgartner, MD, b Miami, Fla; and Bern, Switzerland

CONCLUSION

Current evidence on AND raises serious concerns about long-term durability of stent graft fixation in the proximal aortic neck despite a significant heterogeneity in measurement methods and definitions of AND. Further
Proximal neck at all?

AAA growth from 5.5 to 8cm
AND after EVAR

✔ Meta-analysis

✔ Inclusion criteria

1. To report AND after EVAR

2. To include at least 5 patients

3. To provide data on AND quantification

Kouvelos et al, J Endovasc Ther 2017
AND after EVAR

✓ 26 articles

✓ published between 1998 and 2015

✓ 9721 patients
Incidence of aortic neck dilatation

12 studies – 8550 pts

<table>
<thead>
<tr>
<th>Study name</th>
<th>Time point</th>
<th>Event rate</th>
<th>Lower limit</th>
<th>Upper limit</th>
<th>Z-Value</th>
<th>p-Value</th>
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</thead>
<tbody>
<tr>
<td>Makaroun</td>
<td>2001</td>
<td>0.153</td>
<td>0.117</td>
<td>0.197</td>
<td>-10.919</td>
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<tr>
<td>May</td>
<td>2003</td>
<td>0.039</td>
<td>0.010</td>
<td>0.144</td>
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<td>Cao</td>
<td>2003</td>
<td>0.283</td>
<td>0.228</td>
<td>0.344</td>
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<td>Napoli</td>
<td>2003</td>
<td>0.211</td>
<td>0.139</td>
<td>0.307</td>
<td>-5.104</td>
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<td>Dillardou</td>
<td>2005</td>
<td>0.170</td>
<td>0.145</td>
<td>0.199</td>
<td>-16.078</td>
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<td>Malas</td>
<td>2005</td>
<td>0.006</td>
<td>0.000</td>
<td>0.094</td>
<td>-3.555</td>
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<tr>
<td>Sampaio</td>
<td>2006</td>
<td>0.507</td>
<td>0.426</td>
<td>0.588</td>
<td>0.167</td>
<td>0.868</td>
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<td>Badger</td>
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<td>0.473</td>
<td>0.388</td>
<td>0.559</td>
<td>-0.616</td>
<td>0.538</td>
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<td>Dalainas</td>
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<td>0.240</td>
<td>0.190</td>
<td>0.297</td>
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<td>Diethe</td>
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<td>0.351</td>
<td>0.339</td>
<td>0.363</td>
<td>-23.448</td>
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<td>Pintoux</td>
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<td>0.241</td>
<td>0.148</td>
<td>0.367</td>
<td>-3.732</td>
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<td>Oberhuber</td>
<td>2012</td>
<td>0.223</td>
<td>0.153</td>
<td>0.314</td>
<td>-5.269</td>
<td>0.000</td>
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</tbody>
</table>

24.6% of the patients
(95% CI 18.6% to 31.8%)
Clinical outcome during FU

7 studies – 1759 pts
endoleak type I, migration, reintervention

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Aortic neck dilatation</th>
<th>No aortic neck dilatation</th>
<th>Odds Ratio M-H, Random, 95% CI Year</th>
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<tr>
<td>Makaroun</td>
<td>1</td>
<td>0</td>
<td>16.83 [0.68, 419.35] 2001</td>
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<td>1</td>
<td>32.31 [3.59, 291.05] 2003</td>
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<td>May</td>
<td>2</td>
<td>3</td>
<td>66.43 [2.64, 1670.67] 2003</td>
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<td>Cao</td>
<td>13</td>
<td>5</td>
<td>8.00 [2.72, 23.51] 2003</td>
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<td>Dillavou</td>
<td>10</td>
<td>20</td>
<td>2.57 [1.17, 5.63] 2005</td>
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<tr>
<td>Oberhuber</td>
<td>7</td>
<td>0</td>
<td>73.18 [3.98, 1345.13] 2012</td>
</tr>
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</table>

Total (95% CI) 339 1420 100.0% 28.70 [5.43, 151.67]

Total events 88 29

Heterogeneity: Tau² = 3.62; Ch² = 34.03, df = 6 (P < 0.00001); τ² = 82%
Test for overall effect: Z = 3.95 (P < 0.0001)
High-risk for AND

- Graft oversizing
- Small/Large size proximal neck
- Type of endograft (Sx vs Bx)
Aortic neck enlargement after endovascular aneurysm repair using balloon-expandable versus self-expanding endografts

Janis Savlovskis, MD, a Dainis Krievins, MD, PhD, b Jean-Paul P. M. de Vries, MD, PhD, c Andrew Holden, MD, d Kaspars Kasis, MD, d Marcis Gedins, MD, d Natalija Ezite, MD, d and Christopher K. Zariņš, MD, d

Riga, Latvia; Nieuwegein, The Netherlands; Auckland, New Zealand; and Stanford, Calif

VS.

AND Not Associated with EVAS
Aortic Neck Stability after Polymer Sealing with Ovation

- 161 patients
- Mean follow-up 32mo (24-50)
- CT scans with 2yr follow-up for 89 cases
- Three zones (A, B, C) examined separately
- Morphological comparison between preoperative and postoperative images
Aortic Neck Stability after Polymer Sealing with Ovation

No AND after a minimum 2 year follow-up

Aortic Neck Stability after Polymer Sealing with Ovation

Core lab results demonstrate stable neck diameter and durable seal with Ovation through 5 years.

Wide Infrarenal Neck

- Wide infrarenal neck seems to be associated with worse outcome
Outcomes of endovascular aneurysm repair performed in abdominal aortic aneurysms with large infrarenal necks

Mauro Gargiulo, MD, PhD, Enrico Gallitto, MD, PhD, Helene Wattez, MD, Fabio Verzini, MD, PhD, Claudio Bianchini Massoni, MD, Diletta Loschi, MD, Antonio Freyrie, MD, PhD, and Stephan Haulon, MD, PhD, Bologna and Perugia, Italy; and Lille, France

Mean increase

- 11% for the lowest renal
- 3% to 5% at the level of the renal arteries
- <3% for the SMA and CT

12% type I endoleak
EVAR in Wide Infrarenal Necks

Standard endovascular aneurysm repair in patients with wide infrarenal aneurysm necks is associated with increased risk of adverse events

Nelson F. G. Oliveira, MD, a,b Frederico M. Bastos Gonçalves, MD, PhD, a,c Marie Josee Van Rijn, MD, PhD, a Quirina de Ruiter, MSc, d Sanne Hoeks, PhD, e Jean-Paul P. M. de Vries, MD, PhD, f Joost A. van Herwaarden, MD, PhD, d and Henie J. M. Verhagen, MD, PhD, g Rotterdam, Nieuwegein, and Utrecht, The Netherlands; and Azenhas and Lisbon, Portugal

- Seventy-four patients (17.3%) with a neck diameter of >30 mm were compared with a control group of 353 patients.
- Standard EVAR with an Endurant stent graft
- Median follow-up 3.1 years

Oliveira et al, J Vasc Surg 2017
Conclusions: EVAR in patients with large diameter necks is associated with an increased risk of neck-related adverse events in midterm follow-up. This may influence the clinical decision regarding choice of repair and toward a more intensive surveillance following EVAR in these patients in the long term. (J Vasc Surg 2016;1:1-9.)
Discussion

• Literature
  – Definition & Quality of Proximal Neck (Length)
  – Degree of oversizing?

• AND and BE Stents
  – Seem to „treat“ the neck better....
  – Why better than open repair?