Endovascular Treatment of the Aorta with Fenestrated and Branched Grafts

Eric LG Verhoeven, MD, PhD, A. Katsargyris, MD
Vascular and Endovascular Surgery, Paracelsus Medical University, Nuremberg, Germany
Disclosures

• William Cook Europe/Cook Inc.
  – Consultant & Research grants

• W.L. Gore & Associates
  – Consultant & Research grants

• Atrium Maquet
  – Consultant

• Siemens
  – Consultant
Vascular surgery has changed...
Purpose of F & B grafts

• To treat complex AAA and TAAA by endovascular means

• Important basic rule: strong fixation and sealing proximally

• Custom made, individually tailored grafts
F&B Procedures per year

- **TAAA**: Various bars indicating the number of procedures for each year.
- **All Cases**: Similar bars showing the total number of procedures for the same years.

The years range from 2001 to 2018, with a consistent increase in the number of procedures over the years.
Lay-out

• Complex Abdominal Aortic Aneurysms

• Thoraco-abdominal Aneurysms
Complex Abdominal Aneurysms

- AAA with shorter proximal neck
- Juxtarenal AAA
- Suprarenal AAA
- Thoraco-abdominal aneurysms (TAAA)
Complex Abdominal Aneurysms

- AAA with shorter proximal neck
- Juxtarenal AAA
- Suprarenal AAA
- Thoraco-abdominal aneurysms (TAAA)
Solution: Fenestrated Grafts
Fenestrated EVAR
Goal

• Achieve sealing in short or absent neck

• Position of first sealing stent
  – better portion aorta
  – completely in neck

• Turn a short/no neck into a long neck...
Fenestrated Technique
Maturity

• Catheterization of target vessels
• Stenting of small fenestrations
  – Atrium covered stents
• Technical tricks:
  – Tilting, Flairing, Relining
• Long overlap between components
Fenestrated Technique
Composite System
Bridging Stent-grafts

- Balloon-expandable
  - Atrium V12
  - Life Stream
  - Bentley
  - Jotec
2x, 3x, or 4x FEVAR
Choice According to Landing Zone
Evolution of Stent-graft Design

Use of 3x-4x FEVAR over the years...
F-EVAR Technique
Indication?

• Cardio-Pulmonary Contra-Indications
• Hostile abdomen
• Redo Aortic surgery
  – After EVAR
  – After Open Surgery
Indication?

• Cardio-Pulmonary Contra-Indications
• Hostile abdomen
• Redo Aortic surgery
  – After EVAR
  – After Open Surgery

• “Normal risk patients”
Results Expert Centers

- Follow-up up to 10 years
- Early mortality: <2%
- Target vessel patency at 2 years: > 90%
- Dialysis during follow-up: < 2%
- Decrease of renal function: 10-20%
- Very few endoleaks type I
- No late rupture

• 5-years experience with FEVAR
• 281 pts
• Mortality 0.7%
Thoraco-abdominal Aneurysms

- AAA with shorter proximal neck
- Juxtarenal AAA
- Suprarenal AAA
- Thoraco-abdominal aneurysms (TAAA)
Open repair for TAAA

Acute/Ruptured TAAA

Zenith t-Branch prosthesis

• The only off-the-shelf endovascular stent graft indicated to treat thoracoabdominal aneurysms

• Suitable for a wide range of TAAA anatomy

• Modular system
TAB054
Postop CTA
Ten-year Experience with Endovascular Repair of Thoracoabdominal Aortic Aneurysms: Results from 166 Consecutive Patients

E.L.G. Verhoeven a,*, A. Katsargyris a, F. Bekkema c, K. Oikonomou a, C.J.A.M. Zeebregts c, W. Ritter b, I.F.J. Tielli c

a Department of Vascular and Endovascular Surgery, Paracelsus Medical University, Nürnberg, Germany
b Department of Radiology, Paracelsus Medical University, Nürnberg, Germany
c Department of Surgery, Division of Vascular Surgery, University Medical Center Groningen, University of Groningen, The Netherlands

WHAT THIS PAPER ADDS

This is the largest series in Europe to report longer-term outcomes of endovascular thoracoabdominal aortic aneurysm (TAAA) repair using fenestrated and branched stent grafts. Although endovascular TAAA repair in expert hands is associated with high technical success rate, and remains safe and effective in the mid-term, complications are not rare. Correct patient selection, careful planning, team effort, and technical success are needed to provide the best possible outcome for the patients. The re-intervention rate is not low, but most re-interventions can be performed by endovascular means.
Nuremberg Experience

- 300 Consecutive pts F&B stent-grafts for TAAA
- April 2004 – January 2017
- Suprarenal aortic aneurysms excluded
Stent-graft Design

- Branches only
  - N=93 (31.0%)

- Fenestrations only
  - N=92 (30.7%)

- Branches + Fenestrations
  - N=115 (38.3%)
Postoperative Data

• Mortality
  – 30d: N=18 (6.0%)
  – In-hospital: N=21 (7.0%)
  – ↑ in ASA IV vs. ASA ≤ III pts
    (25% vs 6.2%, p=0.006)

• Major complications
  – N=78 (26.0%)
Late Mortality

- All cause late mortality: N=42
  - 2 Related deaths (aortoesophageal fistula, graft infection)
  - Late mortality in ASA IV vs ASA ≤ III pts
    (50% vs 13.4%, p=0.004)

Estimated Survival
- 83.2 ± 3% at 1 year
- 79.1 ± 3.3% at 2 years
- 70 ± 5.4% at 5 years
• Avoid treating ASA IV?

• Or:
  – Only if good anatomy?
  – Evaluate Co-M better?
Conclusion - TAAA

- Endovascular repair of TAAA
  - Feasible
  - ↓ M & M vs Open surgery
    - ↓ SCI
  - ↑ Reinterventions (endovascular)
  - First choice in the great majority of pts
  - Limitations....
Prerequisites for Endovascular Repair of TAAA

- Team
- Set-up
  - Hybrid room
  - Stock
- High volume
Conclusions

• Complex Abdominal AAA: endovascular first choice
• TAAA: endovascular whenever possible
• Our task is to select the best option (and graft/technique) for each patient, irrespective of......
Join the discussion on advances in endovascular aortic treatments and meet noted interventional radiologists, vascular surgeons and cardiologists in a unique interdisciplinary setting.

www.aorticideas.org
Endovascular Treatment of the Aorta with Fenestrated and Branched Grafts

Eric LG Verhoeven, MD, PhD, A. Katsargyris, MD
Vascular and Endovascular Surgery, Paracelsus Medical University, Nuremberg, Germany