Lessons learned from F&B Repair in Post-Dissection TAAA

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Chronic Dissection

- Definition & Indication for Treatment: Post-Dissection Aneurysm
- Extension: Thoraco-abdominal
- Type: not only Type B
Lay-out

- Treatment Options in post-dissection TAAAs
- Feasibility and Results of F/B EVAR
- Points of Attention
- Value of Inner Branches
Post-dissection TAAA
Treatment Options

• Open surgery
• F/B EVAR
• Candy Plug and Knickerbocker
  – Tilo Kölbel – Hamburg
• „Stabilise“- like techniques
  – Lars Kock - Hamburg
Feasibility

- We can work in a small True Lumen
- Fairly Easy to switch from True/False lumen
  ⟷ Many entries/re-entries...
- Additional technical challenges ⟷ unfriendly anatomy
Mid-Term Results of Fenestrated/Branched Stent Grafting to Treat Post-dissection Thoraco-abdominal Aneurysms

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\textbf{WHAT THIS PAPER ADDS}

This is the largest report with mid-term follow up on fenestrated/branched stent grafting for patients with post-dissection thoraco-abdominal aortic aneurysm (TAAA), following a previous report from 2014. It now includes 71 patients from two institutions experienced in advanced endovascular techniques and demonstrates that fenestrated/branched stent grafting is feasible and a promising alternative for the treatment of this complex type of pathology.

\textbf{Objectives}: Patients surviving acute aortic dissection are at risk of developing a post-dissection thoraco-abdominal aortic aneurysm (PD-TAAA) during follow up, regardless of the type of treatment in the acute setting. Fenestrated and branched stent grafting (F/B-TEVAR) has been used with success to treat PD-TAAA, albeit reported only with short-term results. The aim of this study was to report mid-term results in a cohort of 71 patients.

\textbf{Methods}: This was a retrospective analysis of a prospectively maintained database including all patients with PD-TAAAs who underwent F/B-TEVAR within the period January 2010 - April 2017 at two vascular institutions experienced in endovascular techniques.

\textbf{Results}: A total of 71 consecutive patients (56 male, mean age 63.8 $\pm$ 10.6 years) were treated. Technical success was achieved in 68/71 (95.8\%) patients. In hospital mortality was four (5.6\%) patients. Peri-operative morbidity was 19.6\%. Three (4.2\%) patients developed severe spinal cord ischaemia, one of these patients 12 months post-operatively. Mean follow up was 25.3 months (1–77 months). Cumulative survival rates at 12, 24, and 36 months were 84.7 $\pm$ 4.5\%, 80.7 $\pm$ 5.1\%, and 70.0 $\pm$ 6.7\%, respectively. Estimated freedom from re-intervention at 12, 24, and 36 months was 80.7 $\pm$ 5.3\%, 63.0 $\pm$ 6.9\%, and 52.6 $\pm$ 8.0\%, respectively. The main reasons for re-intervention were endoleak from visceral/renal arteries and iliac endoleak requiring extension. Target vessel occlusion occurred in 8/261 (3.1\%) vessels (renal artery $n = 4$; superior mesenteric artery $n = 2$; coeliac artery $n = 2$). Mean aneurysm sac regression during follow up was 9.2 $\pm$ 8.8 mm, with a false lumen thrombosis rate of 85.4\% for patients with a follow up longer than 12 months. No ruptures occurred during follow up.

\textbf{Conclusion}: F/B-TEVAR for post-dissection TAAA is feasible and associated with low peri-operative mortality and peri-operative morbidity. Mid-term results demonstrate a high rate of aneurysm sac regression. Rigorous follow up is required because of the significant re-intervention rate. Longer bridging covered stents for target vessels are advised.

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\textbf{Keywords}: Fenestrated, Branched, Chronic dissection, Thoraco-abdominal aneurysm
Updated Experience (N=78)
Nürnberg (N=49)/Regensburg (N=29)

• 57/78 after previous surgery:
  – Proximal stent-grafting for Type B (N=34)
  – Open surgery for Type A (N=23)

• Type of Graft:
  – Combination of Fenestrations/Branches (N=27)
  – Fenestrations only (N=43)
  – Branches only (N=8)
Surgical Outcome

• Technical Success (endovascular): N=74 (95%)
  – 1 Assisted (Retrograde renal catheterisation)
  – 2 RA Catheterization Failure
  – 1 Conversion

• 30-d Mortality: N=4 (5%)
  – Cardiac (N=2)
  – MOF (N=1)
  – Caval Vein rupture (post-op Sheldon) (N=1)
Surgical Outcome

- SCI: N=12 (15.4%)
  - Paraparesis (N=9), complete recovery
  - Paraplegia (N=3), improvement to paraparesis
Late Results: Survival
F/U: 26.6 months (1-77 months)

- 12 Aneurysm unrelated deaths
- No ruptures
Late Results: Target Vessels  
F/U: 26.6 months (1-77 months)

\[ 98.6 \pm 8.0\% \quad \text{1 Year} \]
\[ 97.2 \pm 1.3\% \quad \text{2 Years} \]
Late Results: Target Vessels
F/U: 26.6 months (1-77 months)

- Target vessel occlusion: N=6
  (3x RRA, 1x LRA, 1x SMA, 1x CA)
  - 4 Patients asymptomatic (RRA, LRA, SMA, CA)
  - 1 Iliac-renal Bypass (RRA)
  - 1 Dialysis (RRA, with occlusion of LRA)
Late Results: Reinterventions
F/U: 26.6 months (1-77 months)

75.8 ± 5.7%  1 Year
62.7 ± 6.8%  2 Years
Late Results: Reinterventions
F/U: 26.6 months (1-77 months)

- Reinterventions due to Endoleak
  - Target vessels  \( \text{N}=13 \) (18 vessels)
  - IBD uni/bilaterally  \( \text{N}=6 \)
  - Extension to EIA/Embolization IIA  \( \text{N}=2 \)
  - Coil Embolization Type II  \( \text{N}=2 \)
  - Lap. Clipping IMA  \( \text{N}=1 \)
Type I EL (left renal artery)

Completion angio

Angio one month after CT
Distal landing in dissected CIA
Distal landing in dissected CIA
Complete sealing during F/U:

Intraoperative Endoleak

Complete sealing @ 12 months
Distal landing in dissected CIA
Incomplete sealing during F/U:

Intraoperative Endoleak

Persisting endoleak @ 9 months
Reintervention: Bilateral IBD
Sac Diameter Regression during F/U

65.5 ± 10.4 mm → 54.2 ± 13.6mm

(p=0.005)
Post-Dissection TAAA
Specific Anatomical Points of Attention

- Small True Lumen
- Stiff Dissection Flap
- Target Vessels originating from True/False lumen
- Lack of Distal Landing Zone
- If already stented proximally
  - Left subclavian artery access?
Adressing Small True Lumen

• Use a tube graft proximally to carefully open the true lumen... a bit?

• Taper the fenestrated/branched graft in the visceral segment
  – To allow room for branches

• Use fenestrations instead of branches
Small TL
LRA through FL
Four Fenestrations
Double Diameter Reducing Ties
Position of Branch

Dissection flap above celiac
Position branch higher
Target Vessels from False Lumen

→ Initial Concern: Perforation of the thickened fibrotic dissection flap?
Target Vessels from False Lumen

→ **Reality:** Easy Switch from TL to FL
The „Inner Branch Option“ in a Post-Dissection TAAA
Potential of Inner Branches

• More wall contact of main graft
• Cover less Aorta proximally
• No Risk of squashing the branch
  – Small diameter
  – Angulation
• Easier catheterization of Vessel
  – Support of the basket guides the catheter
• Flexibility of positioning
Conclusions

• F/B grafts are a realistic option to treat “Post-dissection TAAAs”
  – Careful planning and technical execution required

• Follow-up seems promising
  – False lumen shrinkage/thrombosis
  – No ruptures during FU

• Inner Branches additional valuable option (not only for post-dissection TAAAs)