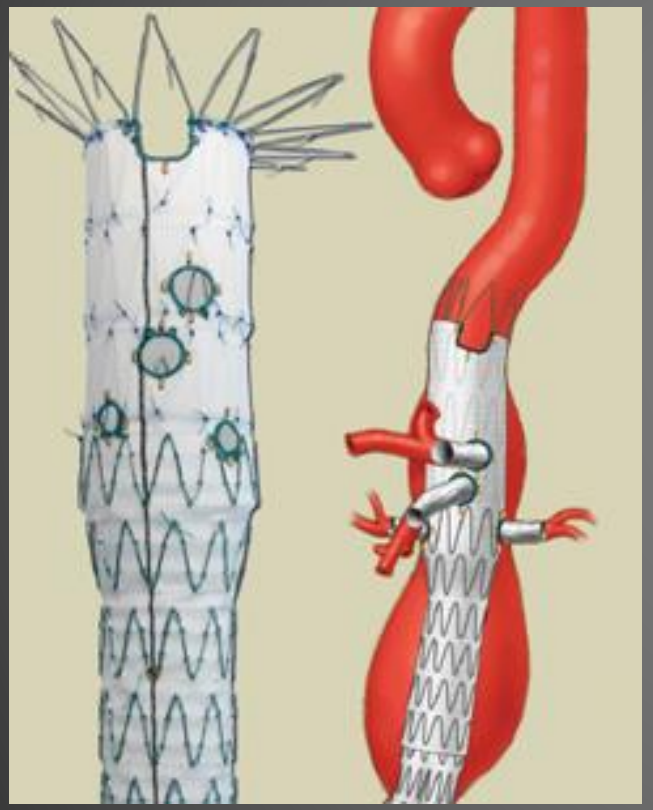
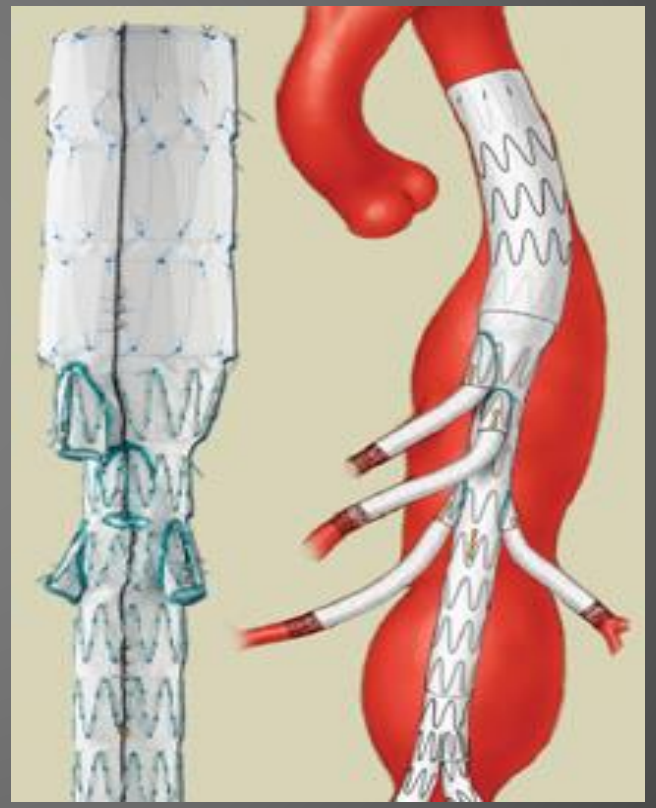
Lessons from the Past:
How to best Design a F-BEVAR





Eric Verhoeven, A. Katsargyris, P. Marques de Marino
Paracelsus Medical University & General Hospital Nuremberg, Germany

Disclosures

- Cook: Royalties, Speaker, Consultant
- Bentley: Speaker, Consultant
- Getinge: Speaker, Consultant

Introduction

- Evolution over the past 20 Years
- Choices to be made: avoid being „dogmatic“
  - Every Design pros/cons
  - Best Solution for each Patient
    - Anatomic
    - Diameter of the Aneurysm
    - Life Expectation of the Patient

F/BEVAR Design

- Pararenal (FEVAR)
- Thoracoabdominal (F/BEVAR)

F/BEVAR Design

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Basic Points of Attention

- Proximal Sealing Zone
- Target vessels
  - Number of Fenestrations
- Overlap (Fenestrated tube-bifurcated graft)
- Distal Sealing Zone

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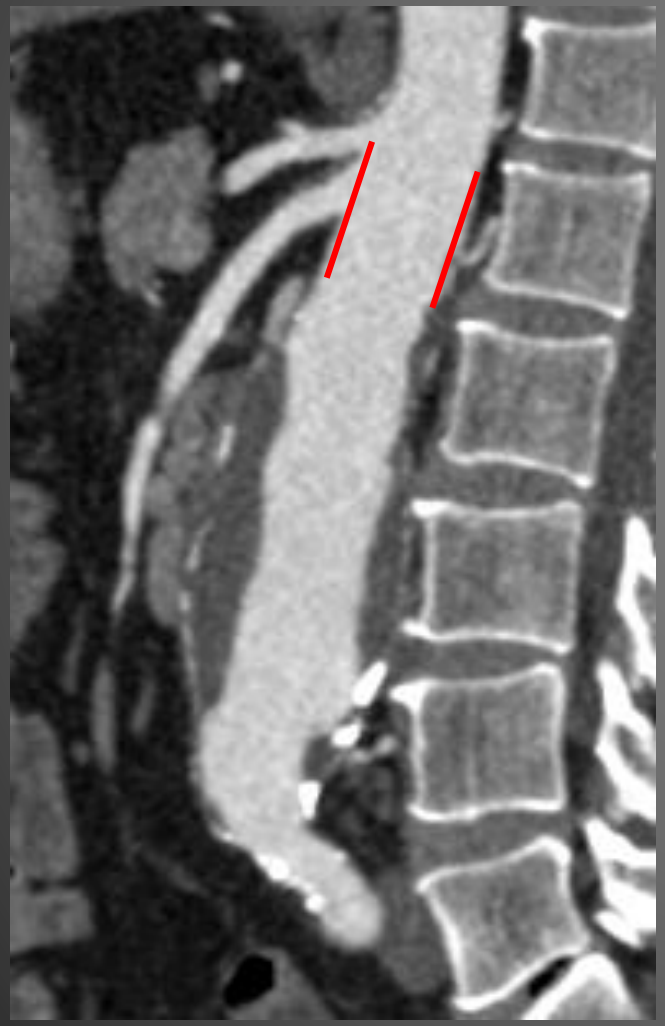
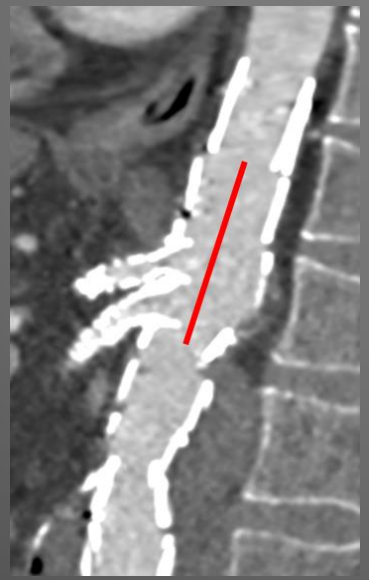
Proximal Sealing Zone
(= Parallel Aortic Wall)



Proximal Sealing Zone

- The longer the better…



Proximal Sealing Zone

- But
  - Stay below major intercostal arteries if possible

Basic Points of Attention

- Proximal Sealing Zone
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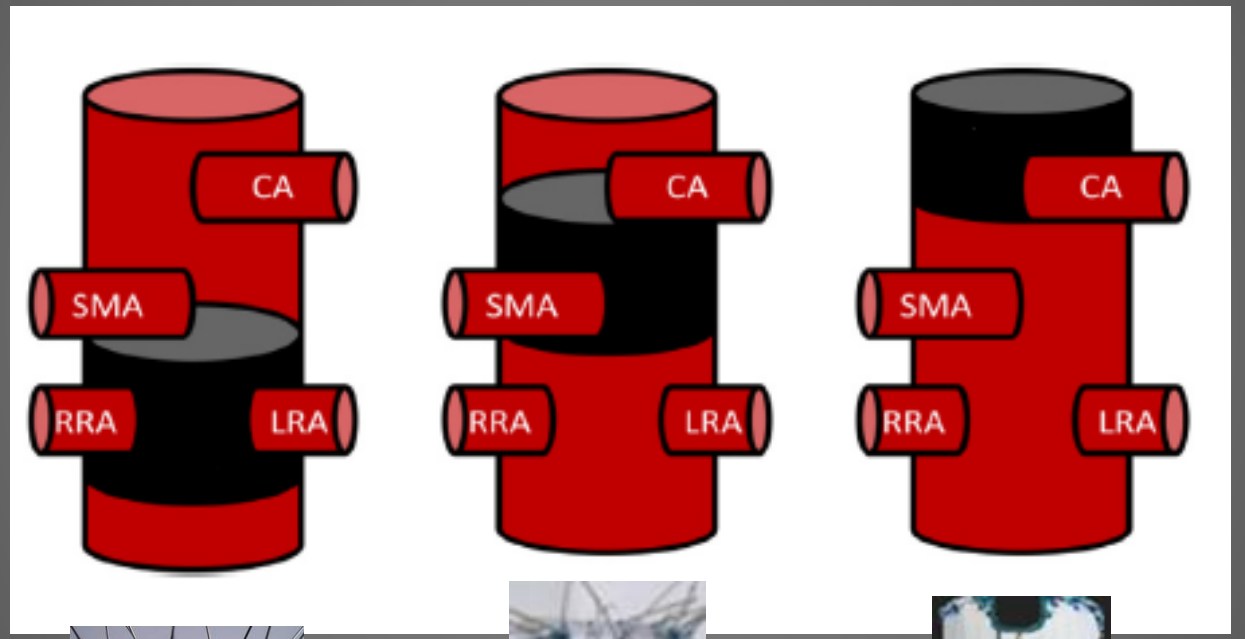
Number of Fenestrations
2x, 3x, or 4x FEVAR



JVS 2015;62:319-25

3x/4x FEVAR vs. 2x FEVAR

Advantages

- Proximal sealing
  - Longer length
  - Healthier aortic wall

- Long-term durability
  - Younger patients

3x/4x FEVAR vs. 2x FEVAR

Theoretical Limitations

- ↑ Planning complexity
- ↑ Set-up requirements
  - Lateral C-Arm views
- ↑ Procedure complexity
  - Duration, Contrast, Fluoro
- ↑ M&M?

Comparison of outcomes for double fenestrated endovascular aneurysm repair versus triple or quadruple fenestrated endovascular aneurysm repair in the treatment of complex abdominal aortic aneurysms

Athanasios Katsargyris, MD,[a] Kyriakos Oikonomou, MD,[a] George Kouvelos, MD,[a] Hozan Mufty, MD,[a] Wolfgang Ritter, MD,[b] *and* Eric L. G. Verhoeven, MD, PhD,[a] *Nuremberg, Germany*

(J Vasc Surg 2017;■:1-8.)

- Complex (3x/4x) FEVAR vs. Standard 2x FEVAR
  - More complex graft planning (not an issue!)
  - ↑ OR & Fluoroscopy Time

but…

Same Perioperative Risk

Other Centers‘ Experience

Early versus late experience in fenestrated endovascular repair for abdominal aortic aneurysm

Magnus Sveinsson, MD,[a] Jonathan Sobocinski, MD, PhD,[b] Timothy Resch, MD, PhD,[a] Björn Sonesson, MD, PhD,[a] Nuno Dias, MD, PhD,[a] Stéphan Haulon, MD, PhD,[b] and Thorarinn Kristmundsson, MD, PhD,[a] *Malmö, Sweden; and Lille, France*

(J Vasc Surg 2015;61:895-901.)

Graft Complexity–Related Outcomes of Fenestrated Endografting for Abdominal Aortic Aneurysms

Journal of Endovascular Therapy
1–7

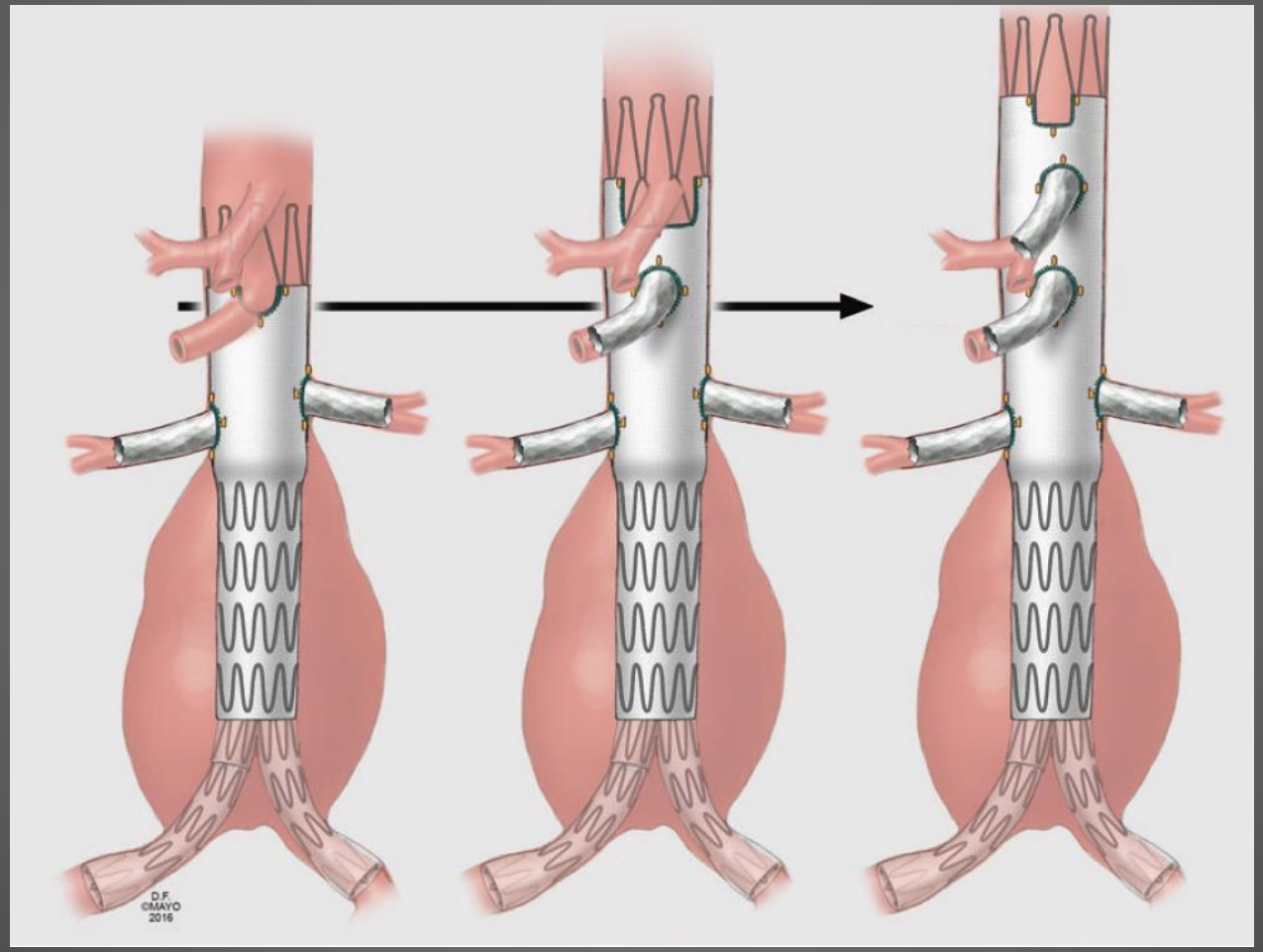
DOI: 10.1177/1526602817691752
www.jevt.org
SAGE

Kyriakos Oikonomou, MD[1], Piotr Kasprzak, MD, PhD[1], Wilma Schierling, MD[1], Reinhard Kopp, MD[1], and Karin Pfister, MD[1]

↑ Complexity of FEVAR stent-graft design

→ Does not increase perioperative M&M

FEVAR Design Evolution

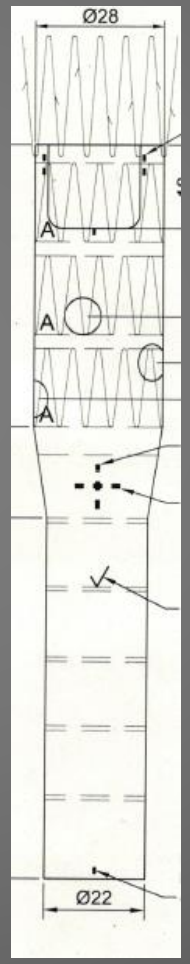


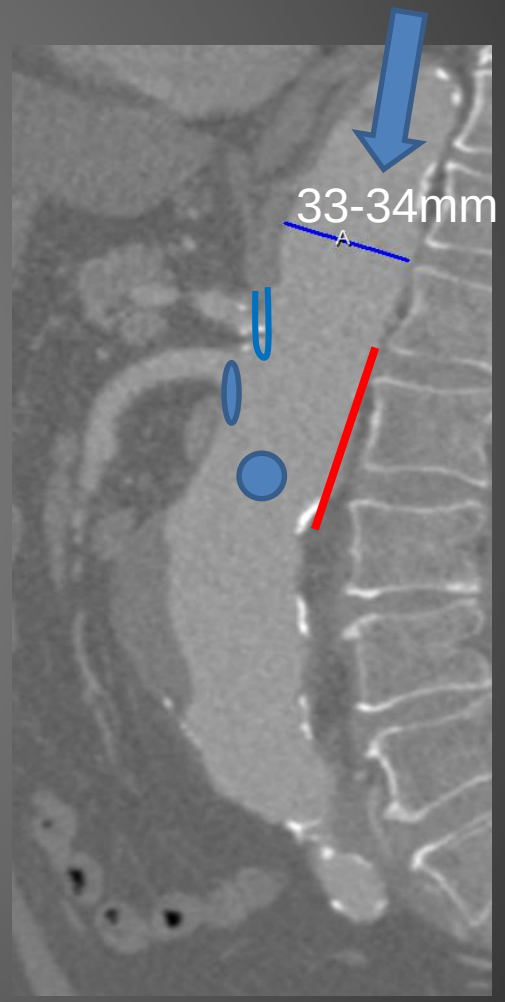
Failed FEVAR
Case Example

- 71 YO Male
- 2011
  - Juxtarenal AAA
    - Dmax: 54 mm
- Co-morbidity
  - CAD

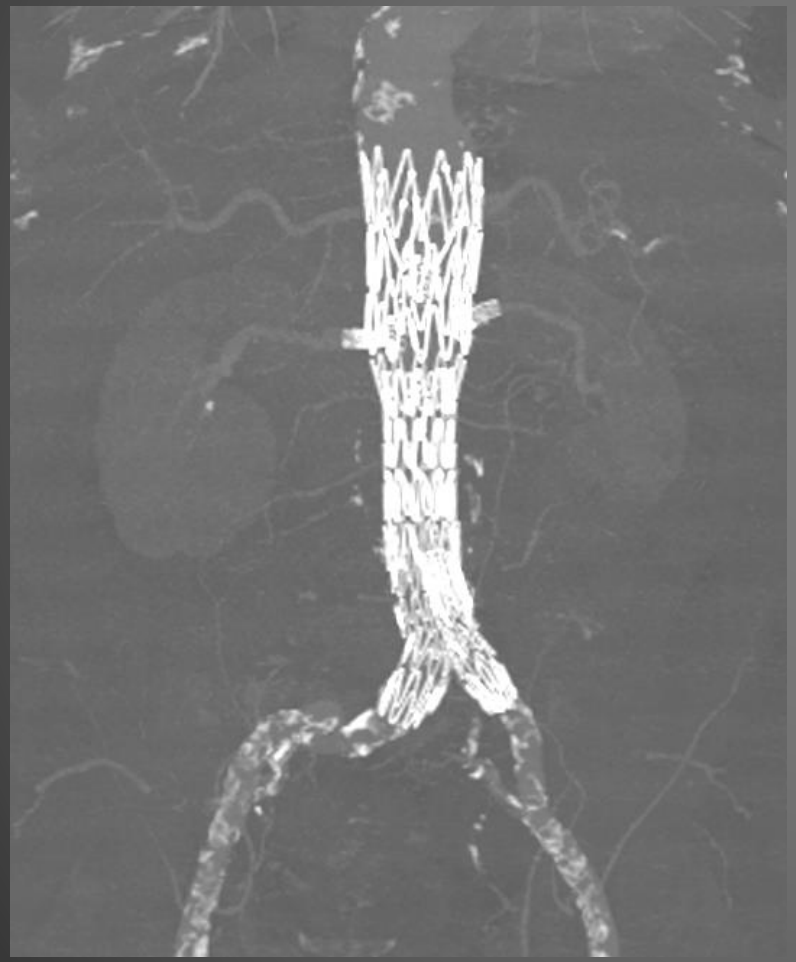
Plan

- 3x FEVAR



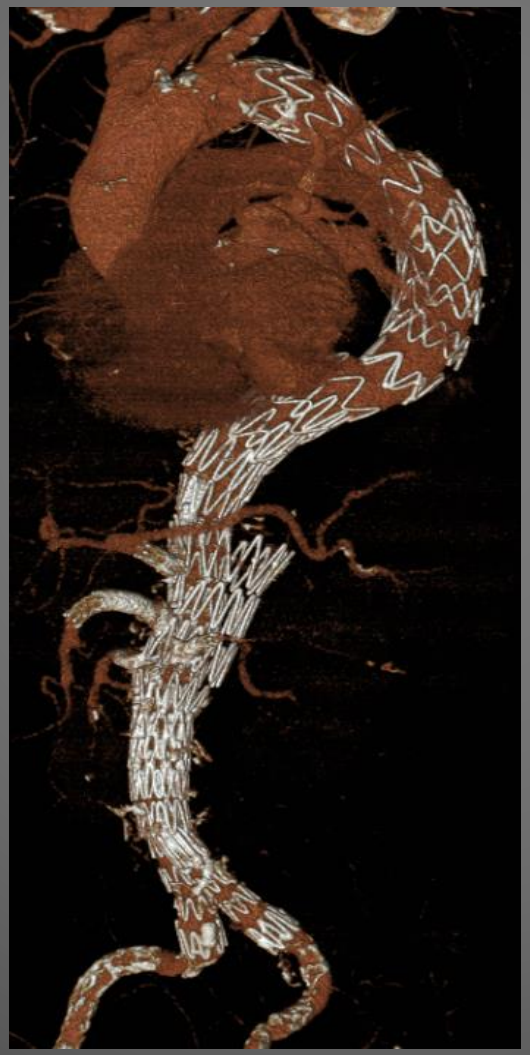


Postop CTA



CTA @ 6 years

Redo F/BEVAR



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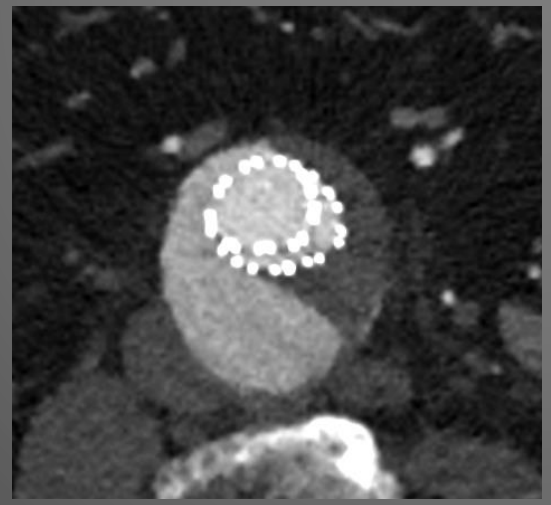
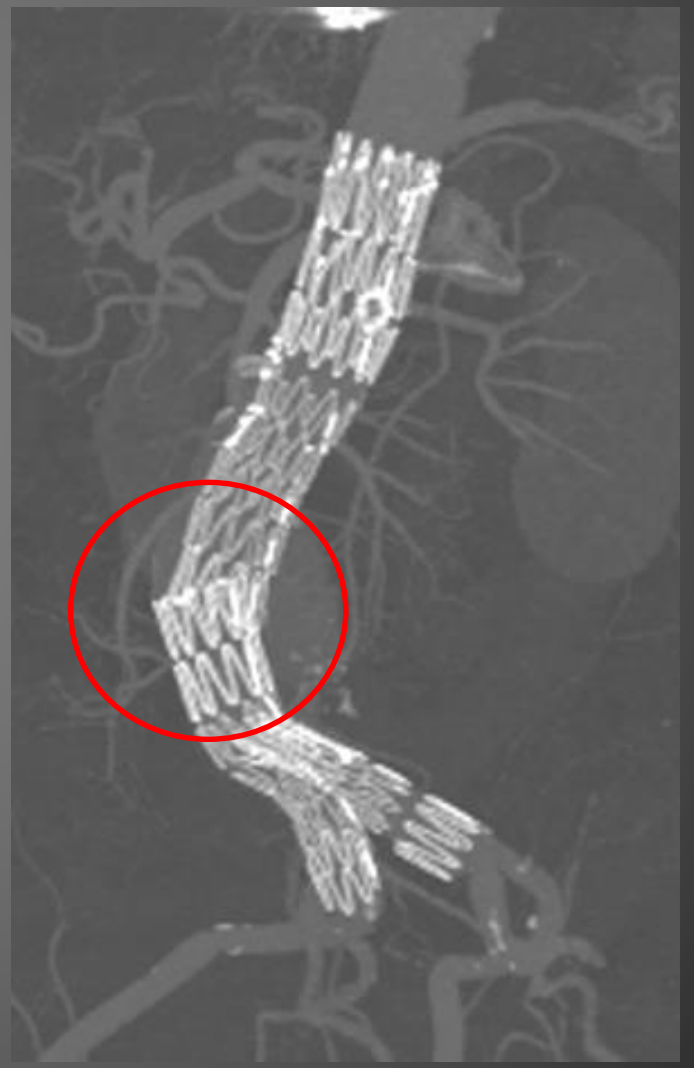
Overlap
Fenestrated tube-Bifurcated graft

- ≥ 3 Stents
- ≤ 2 Stents...
  - Too short!
    - Risk for Disconnection

CTA @ 7 Years

- Disconnection
  - Type III Endoleak





Basic Points of Attention

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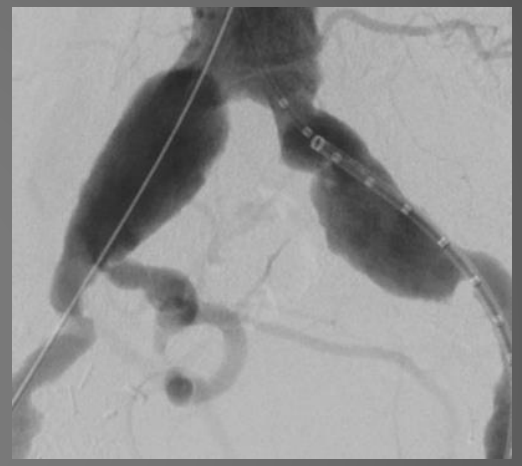
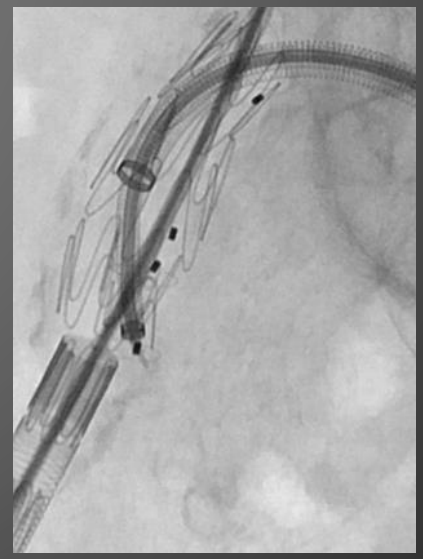
- Distal Sealing Zone

Distal Sealing Zone

- Same as in EVAR



- Consider IBD if needed
  - Especially in extensive aortic coverage



F/BEVAR Design

- Pararenal (FEVAR)
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- Distal sealing zone

Basic Points of Attention

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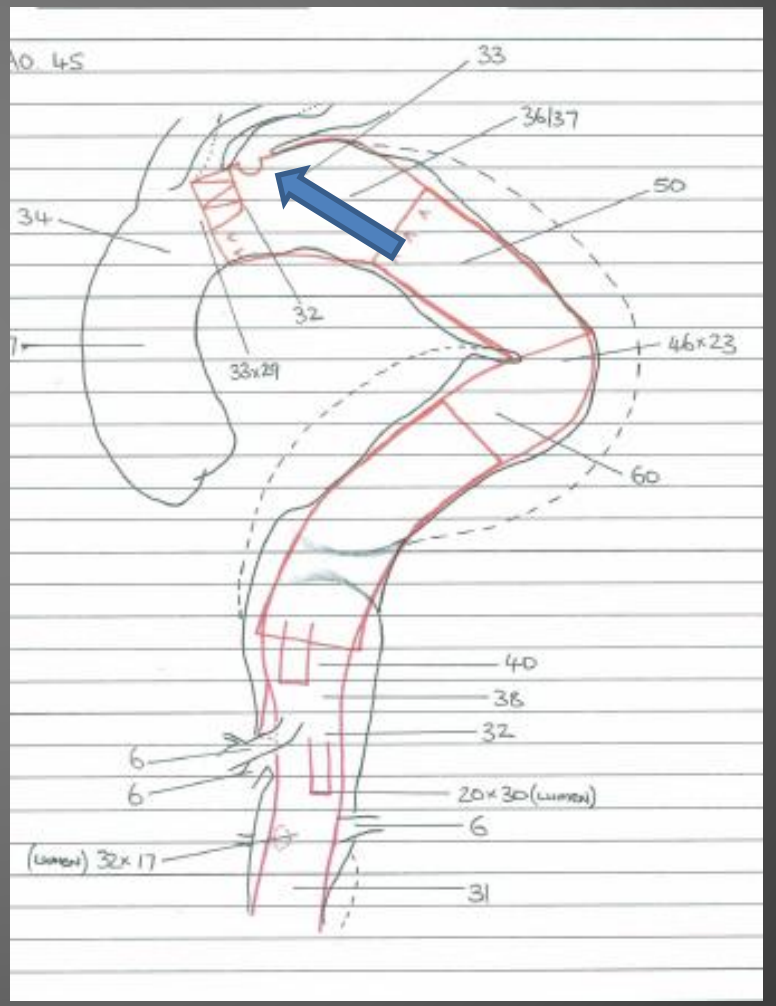
Proximal Sealing Zone

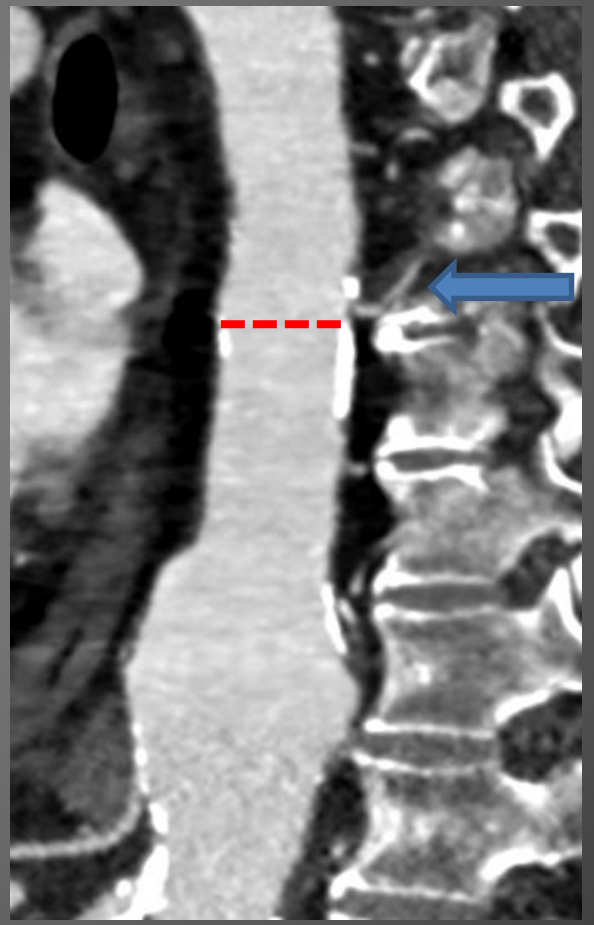
- If not adequate
  - Fenestrated/branched arch
  - Debranching

→ Preserve LSA!!



Proximal Sealing Zone

- Stay below major intercostal arteries
  - Reduce risk for SCI

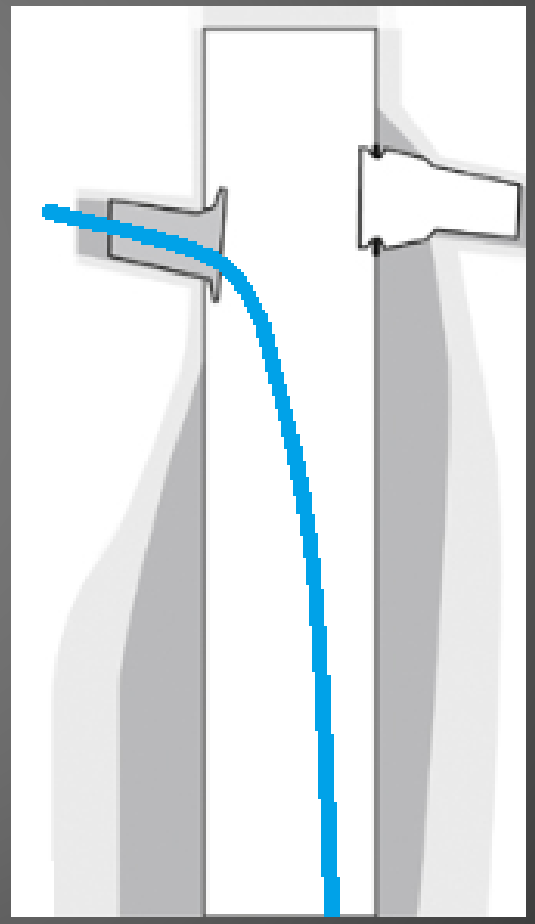


Basic Points of Attention

- Proximal sealing zone
- Target vessels
  - Fenestration or Branch?
- Distal sealing zone

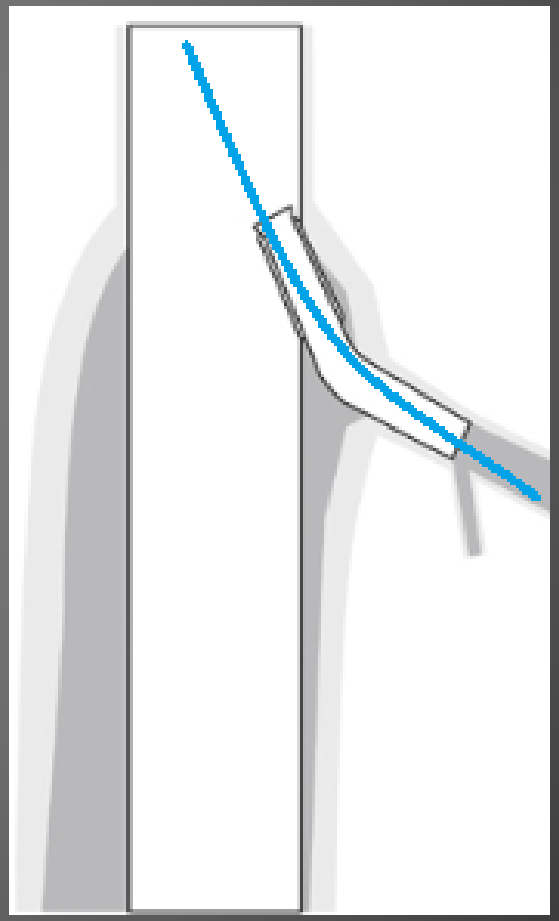
Target Vessel: Fenestration

- 90 degree take-off
- Catheterisation from below
- Graft in contact/close to aortic wall



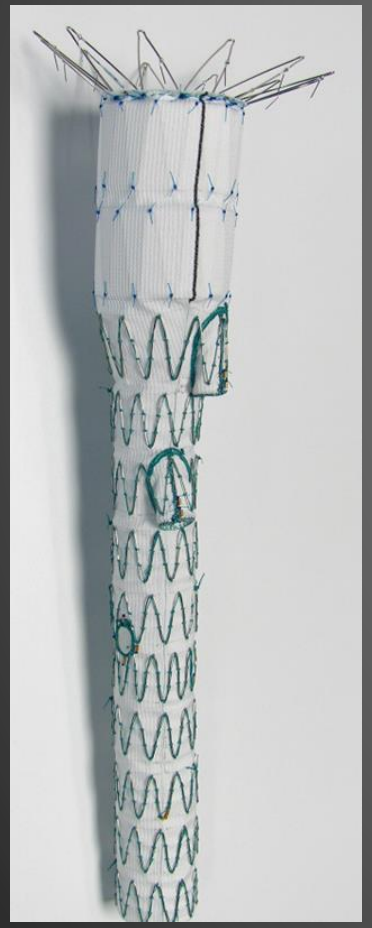
Target Vessel: Branch

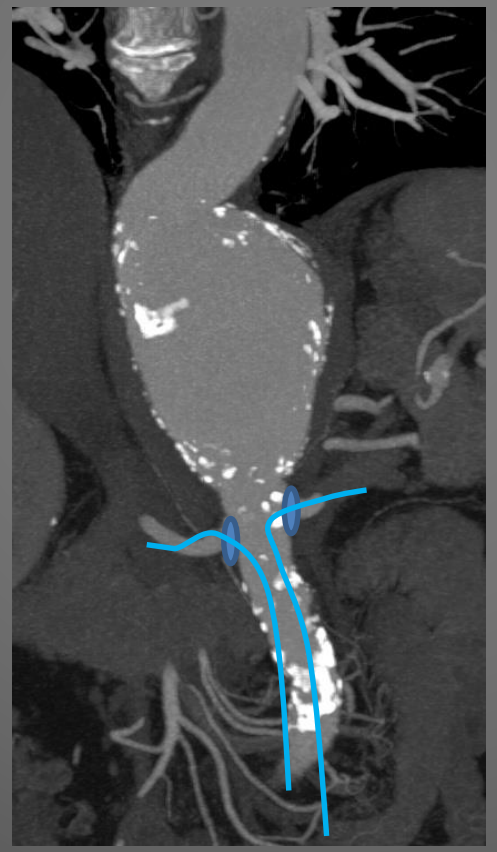
- Sharp take-off
- Catheterisation from above
- Enough space between graft and aortic wall

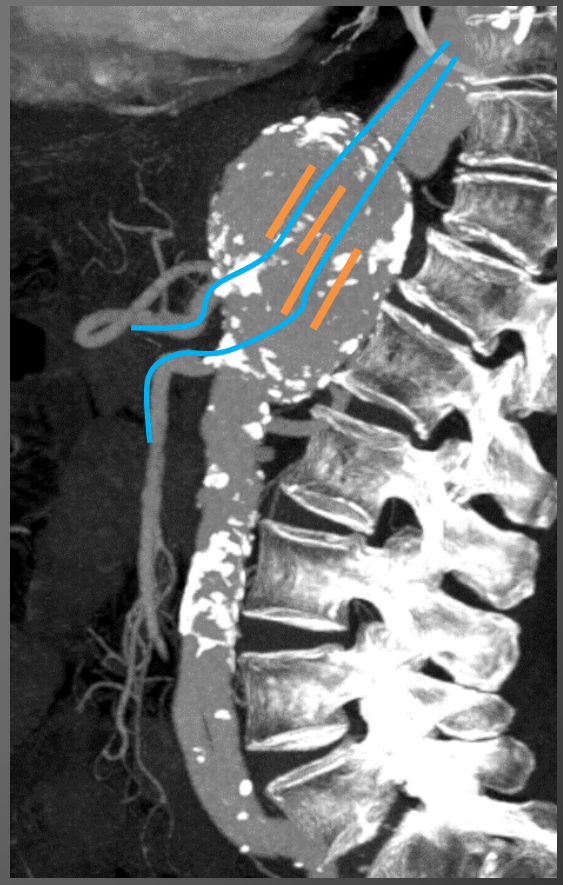


F/B-Graft with both Fens and Branches

(CMD vs. T-Branch?)







Fenestrations or Branches for Renal Arteries?

Mid-term Outcomes of Renal Branches Versus Renal Fenestrations for Thoraco-abdominal Aneurysm Repair☆

T. Martin-Gonzalez [a], T. Mastracci [b], T. Carrell [c], J. Constantinou [b], N. Dias [d], A. Katsargyris [e], B. Modarai [c], T. Resch [d], E. Verhoeven [e], S. Haulon [a,*]

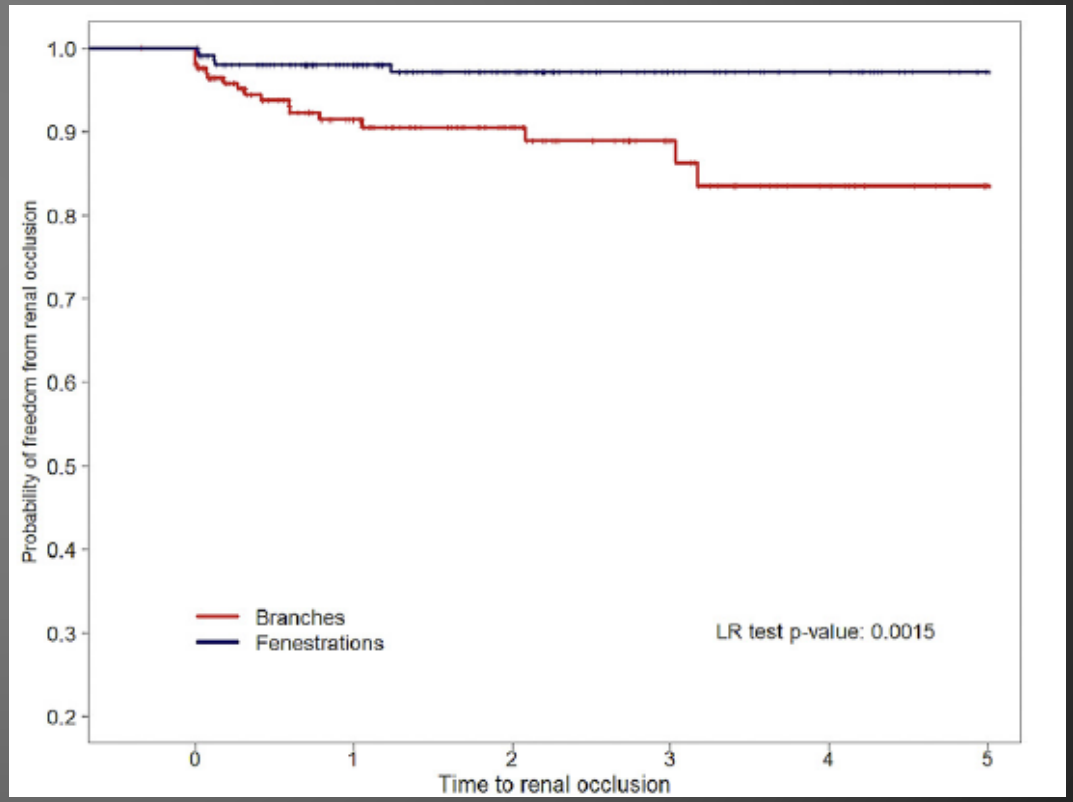
Eur J Vasc Endovasc Surg (2016) 52, 141—148

- 449 pts (235 BEVAR, 214 FEVAR)

Fenestrations or Branches for Renal Arteries?

Fenestrations significantly better patency rates!

Branches significantly higher instability
(occlusion/reintervention)

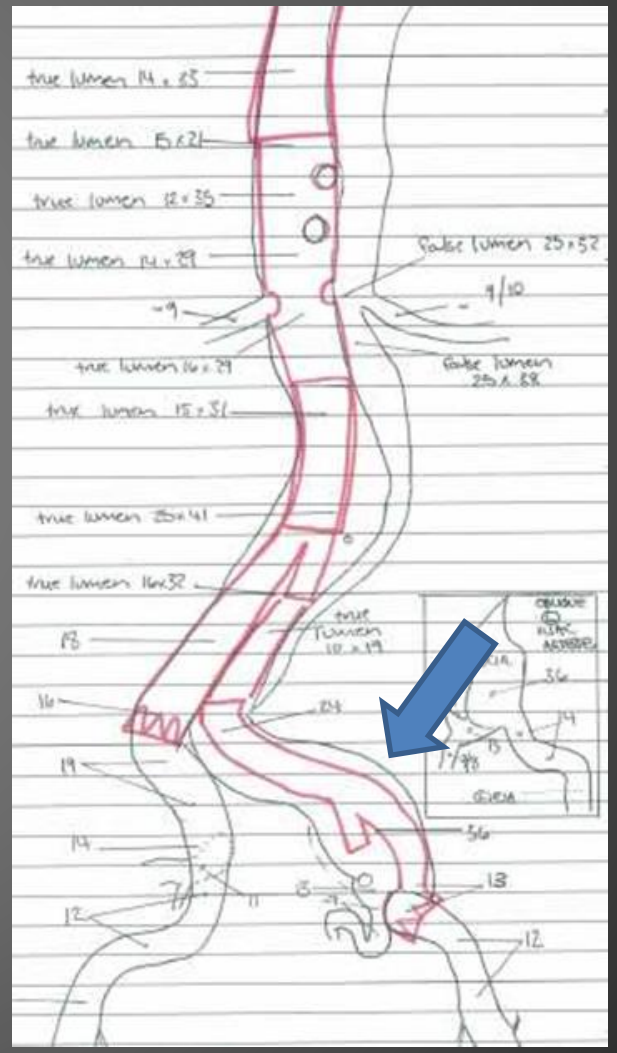


Basic Points of Attention

- Proximal sealing zone
- Target vessels
  - Fenestration or Branch?
- Distal sealing zone

Distal Sealing Zone

- Consider IBD/IBE if needed
  - Preserve IIA: ↓ the risk for SCI



F/BEVAR Design

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  - Basic Points of Attention
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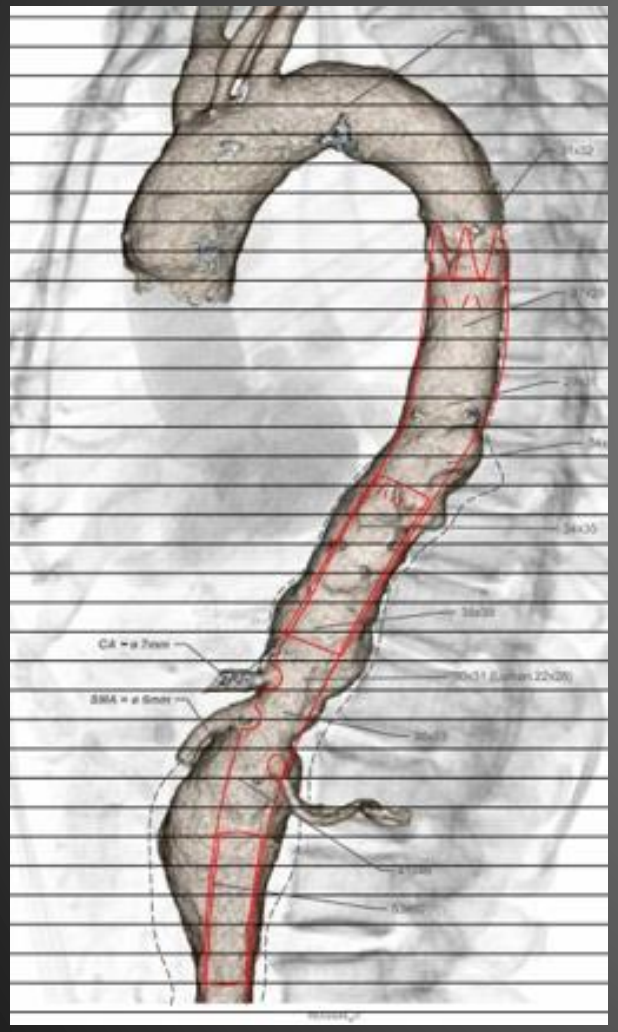
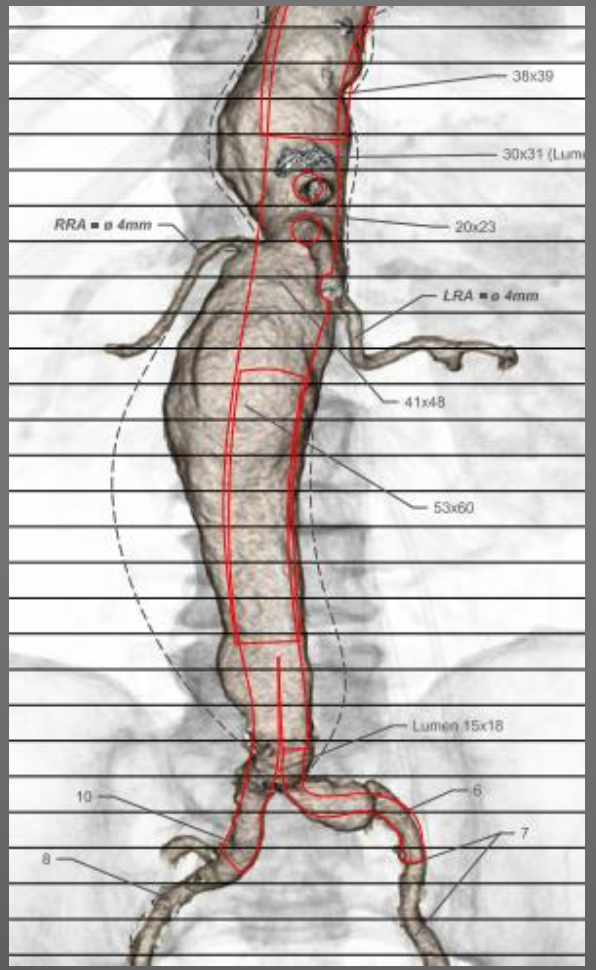
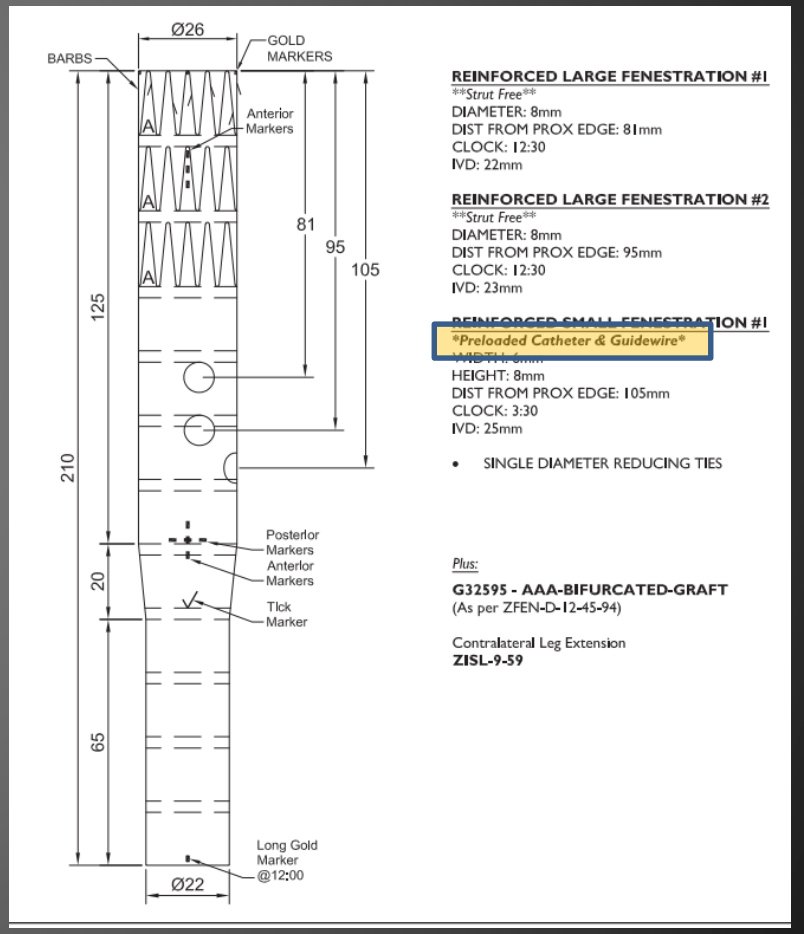
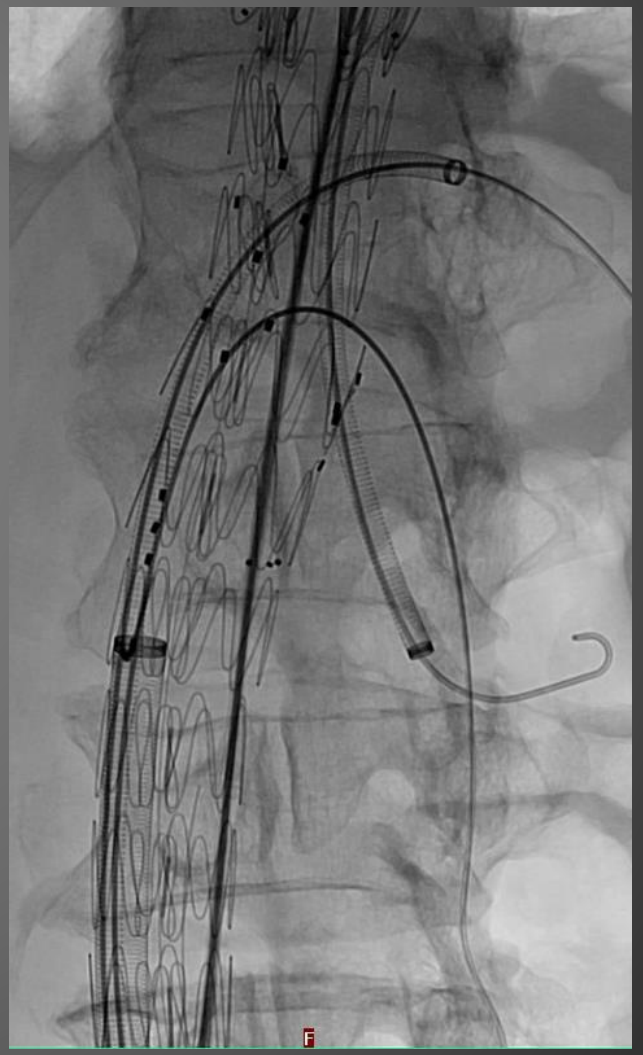
Fenestration with upper Approach







Procedure



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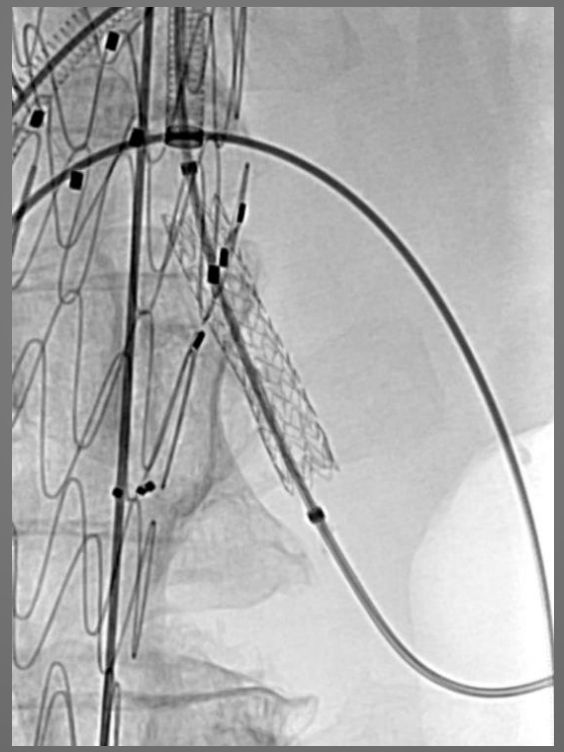


Branches from a Femoral Approach
(Panuccio)

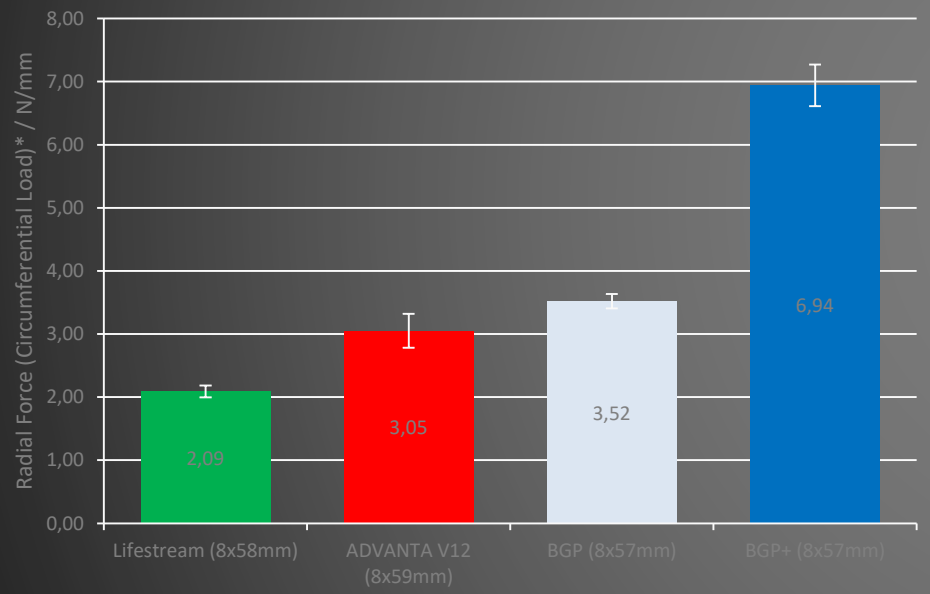
BEVAR
Catheterization of Target Vessels

- Via Upper Approach
  - Left Axilla
- Via Lower Approach
  - With Steerable Sheaths
  - Especially in Grafts including both fens and branches

- Choice: guided by Anatomy/Number of Branches/Risk of Paraplegia
  - Choose the easiest Route
  - Take Occlusion Time into Account

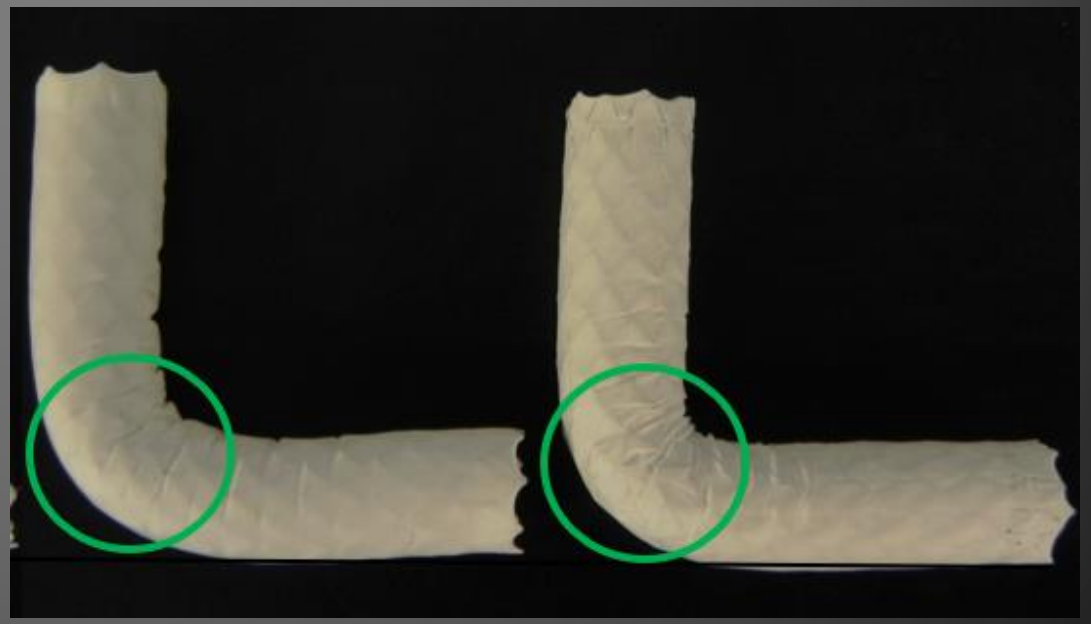
BeGraft PLUS

Radial Force and Kink Resistance



BeGraft (8x57mm)

BeGraft PLUS (8x57mm)



Conclusions

- Pararenal AAA
  - Create a long proximal sealing zone!
  - Liberal decision towards 3x/4x-FEVAR
  - 4x FEVAR enables easier extension/repair in the future

Conclusions

- TAAA
  - Preserve LSA & Hypogastric arteries!
  - Stay below large intercostal arteries (where possible)
  - Fenestration/branch according to each target vessel anatomy
    - Prefer Fenestrations vs Branches for renal arteries?
  - Use T-Branch in larger TAAA?
    - BeGraft PLUS