3x-4x FEVAR vs. Standard 2x FEVAR
Advantages, Limitations And Differing Results

Disclosures

– Thanos Katsargyris
  – None

– Eric Verhoeven
  – Consultant & Speaker for Cook
  – Research Grants from Cook

2x, 3x, or 4x FEVAR
Choice According to Landing Zone

Standard 2x FEVAR

• Short neck AAA
• Juxtarenal AAA

3x-4x FEVAR

• Juxtarenal AAA
• Suprarenal AAA
• (Some type IV TAAA)

3x-4x FEVAR vs. Standard 2x FEVAR
Theoretical Advantages

• Proximal sealing
  – Longer length
  – Healthier aortic wall

• Long term durability
  – Younger patients
3x-4x FEVAR vs. Standard 2x FEVAR
Theoretical Limitations

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

Results of complex aortic stent grafting of abdominal aortic aneurysms stratified according to the proximal landing zone using the Society for Vascular Surgery classification

• 2002-2011, 288 pts (Malmö & Lille)
  • ↑ Complexity of stent-graft design over years
    – No ↑ OR time, M&M

• 2008-2013, 150 pts
  • ↑ Complexity of stent-graft design
    – ↑ OR Time, EBL, M&M, Hospital stay

• 2001-2013, 610 pts
  • 3x-4x FEVAR
    – ↑ Branch Reinterventions
    – ↓ Type I Endoleak (1.9% vs 10.4%, P<0.01)
  • ↑ N of Fenestrations to treat same anatomy...

Nuremberg Experience
01/2010-10/2015

• 333 Consecutive pts FEVAR treated for Short neck, Juxtarenal, Suprarenal AAA
• Disclosures
  – Experienced team, no learning curve
  – Set-up with two Arts Zeego hybrid Rooms
  – High Volume Center

Stent-graft Design

• Standard 2x FEVAR
  – N=196 (58.9%)
• Complex 3x-4x FEVAR
  – N=137 (41.1%)
**Evolution of Stent-graft Design**

↑ Use of 3x-4x FEVAR over the years...

**Technical Success**

Overall: N=324/333 (97.3%)  
- **Standard 2x FEVAR**  
  - N=192/196 (98%)  
- **Complex 3x-4x FEVAR**  
  - N=132/137 (96.4%)  
  (P=0.5, NS)

**Operative Data**

**Mean Operation Time**

- **Standard 2x FEVAR**  
  - 136 ± 49 min
- **Complex 3x-4x FEVAR**  
  - 174 ± 55 min  
  (P<0.05)

**Mean Fluoroscopy Time**

- **Standard 2x FEVAR**  
  - 45 ± 17 min
- **Complex 3x-4x FEVAR**  
  - 59 ± 20 min  
  (P< 0.05)

**Mean Contrast Volume**

- **Standard 2x FEVAR**  
  - 142 ± 32 ml
- **Complex 3x-4x FEVAR**  
  - 161 ± 36 ml  
  (P<0.05)

**30-Day Mortality**

Overall: N=2/333 (0.6%)  
- **Standard 2x FEVAR**  
  - N=1/196 (0.5%)  
- **Complex 3x-4x FEVAR**  
  - N=1/137 (0.7%)  
  (P=1.0, NS)
Major Complications

Overall: N=38/333 (11.4%)

- **Standard 2x FEVAR**
  - N=18/196 (9.2%)

- **Complex 3x-4x FEVAR**
  - N=20/137 (14.6%)

(P=0.16, NS)

Follow-up Data

Mean duration: 20 ± 16.1 months

Estimated Survival

- **Standard 2x FEVAR**
  - 94.7 ± 2.1% at 1 year
  - 80 ± 4.7% at 3 years

- **Complex 3x-4x FEVAR**
  - 91 ± 3.9% at 1 year
  - 84.3 ± 5.1% at 3 years

P=0.79, NS

Freedom from Reintervention

- **Standard 2x FEVAR**
  - 96.1 ± 1.7% at 1 year
  - 90.0 ± 3.3% at 3 years

- **Complex 3x-4x FEVAR**
  - 97.6 ± 1.7% at 1 year
  - 92.1 ± 4.1% at 3 years

P=0.68, NS

Target Vessel Patency

- **Standard 2x FEVAR**
  - 99.5 ± 0.4% at 1 year
  - 99.0 ± 0.3% at 3 years

- **Complex 3x-4x FEVAR**
  - 98.7 ± 0.7% at 1 year
  - 98.0 ± 1.0% at 3 years

P=0.23, NS

Conclusions

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

  Same Perioperative Risk
Take Home Message

• Do not hesitate to move up to 3x-4x FEVAR if anatomically necessary

• It will increase durability of the repair in the long-term...