The Clinical Utility of Parallel Grafts, Snorkels and Chimneys to Solve Challenging Situations

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✓ Nothing to Disclose
• Complex aortoiliac aneurysm
• Complex thoracoabdominal aortic aneurysm
• Ruptured thoracoabdominal aortic aneurysm
• Pararenal & Juxtarenal aortic aneurysm
Anatomic suitability of aortoiliac aneurysms for next generation branched systems.
Pearce BJ¹, Varu VN², Glöcker R³, Novak Z³, Jordan WD³, Lee JT².

RESULTS: Of the nearly 2,400 aneurysm repairs performed during the study period, 99 patients had common iliac aneurysms suitable for imaging review. Eighteen of the 99 (18.2%) patients and 25/99 (25.3%) patients fit the inclusion criteria and would have been able to be treated using the Cook and Gore iliac branch devices, respectively. The most common reason for exclusion from Cook was internal iliac diameter of <6 or >9 mm (68/99, 68.7%). The most common reason for exclusion from Gore was proximal common iliac diameter of <17 mm (39/99, 39.4%) and inadequate internal iliac artery diameter of <6.5 or >13.5 mm (37/99, 37.3%). Comparing the included patients across both devices, a total of 35/99 (35.4%) of patients would be eligible for the treatment of aortoiliac aneurysms based on anatomic criteria.

- **18.2% (18/99) and 25.3% (29/99)** fit the IFU inclusion criteria for **COOK and GORE**, respectively.
- The most common exclusion criteria for **COOK IBD** was internal iliac diameter <6 or >9mm **(68.7%)**.
- The most common exclusion criteria for **GORE IBD** was proximal CIA diameter (39.4%) and inadequate internal iliac artery diameter <6.5 or >13.5mm **(37.3%)**.
In this trial, only 35% of AIA have been candidates for the 2 IBD (Cook and Gore).

The most common exclusion criteria is the internal iliac landing zone.

Design modifications for future IBD generation should focus the internal iliac landing zone.

Familiarity with alternate branch preserving techniques IS STILL NEED in the MAJORITY of cases.
Sandwich: Complex Aortoiliac Aneurysm
Sandwich: Complex Aortoiliac Aneurysm
Sandwich: Complex Aortoiliac Aneurysm

REIAA

LEIAA

RHAA

LHAA

1.96 cm

1.47 cm

5.41 cm

7.64 cm

2.61 cm

2.06 cm

3.69 cm

2.84 cm
Sandwich: Complex Aortoiliac Aneurysm
**Sandwich:** Complex Aortoiliac Aneurysm

Measurements:
- 2.46 cm
- 7.18 cm
- 2.56 cm
- 2.00 cm
- 3.71 cm
- 2.67 cm
- 1.73 cm
- 5.24 cm
Sandwich: Complex Aortoiliac Aneurysm
Sandwich: Complex Aortoiliac Aneurysm
Open Repair: Thoracoabdominal Aortic Aneurysm

- Very few centers with acceptable results
- High mortality rate
- Very complex procedure
- High SCI rate
MBEVAR: Thoracoabdominal Aortic Aneurysm

- It is NOT read to go
- A lot of exclusion criteria
- Very complex procedure
- High SCI rate
- Step procedure (1 month interval): big aneurysms (>8cm)?
- Not recommend for TAAA due AD with true lumen compression
Factors Associated with Spinal Cord Ischemia After Multi-Branched Endovascular Thoracoabdominal Aneurysm Repair

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RESULTS: Postoperative SCI occurred in 24/116 (20.6%) patients. Aortic aneurysm (TAAA) repairs is a serious complication with adverse effects on quality of life and long term survival. Many risk factors for SCI after open surgery have been identified; however the pathophysiology of SCI after endovascular repair is less understood. Our aim was to identify factors associated with postoperative SCI following multi-branched endovascular aneurysm repair (MBEVAR) for TAAA.

METHODS: From July 2005 to October 2013, 116 patients with TAAA (30 women; mean age 73.4±7.7y) were treated in a prospective, single center trial for MBEVAR. Symptomatic patients and those with dissection were excluded. SCI was classified into lower extremity paralysis (LEP), permanent lower extremity weakness (pLEW) and transient lower extremity weakness (tLEW). Perioperative spinal cord protection measures included cerebrospinal fluid (CSF) drainage and permissive hypertension.

RESULTS: Postoperative SCI occurred in 24/116 (20.6%) patients. Most patients had tLEW (15/116, 12.9%) with full recovery and less frequently pLEW (n=3/116, 2.6%) or LEP (n=6/116, 5.2%). Most SCI events (79%, 19/24) had a delayed onset (>6h postop), were transient (15/24, 62.5%), and symptoms resolved within a median 1d (IQR 1-3.5d). Prolonged postoperative hypotension was associated with SCI (OR 5.0, 95% CI [1.6-16.1] p<.01). Aneurysm extent or the presence of a postoperative endoleak was not associated with SCI events. The change in C-reactive protein levels from baseline to peak was 1.8 times greater in patients with SCI than those without (p=.03).

CONCLUSIONS: Most episodes of SCI after MBEVAR are transient and do not occur in the operating room. Increased systemic inflammation may have an adverse effect on spinal cord perfusion and play a role in the delayed onset of SCI. Current adjunct strategies to maintain spinal cord perfusion, including permissive hypertension and CSF drainage, may help prevent permanent SCI.
MFM: Thoracoabdominal Aortic Aneurysm

- The real applicability It is NOT clear
- The correct indication are NOT defined
- Should be avoid in very tortuous TAAA, TAAA (>7cm), visceral ostium with a lot of thrombus, visceral stenosis etc.
Sandwich: Thoracoabdominal Aortic Aneurysm
Sandwich: Thoracoabdominal Aortic Aneurysm
Chimney, Periscope & Sandwich: Pararenal Aortic Aneurysm & CIAA
Chimney, Periscope & Sandwich: Pararenal Aortic Aneurysm & CIAA
Chimney, Periscope & Sandwich: Pararenal Aortic Aneurysm & CIAA
Chimney, Periscope & Sandwich: Pararenal Aortic Aneurysm & CIAA
Sandwich: Ruptured Thoracoabdominal Aortic Aneurysm
Sandwich: Ruptured Thoracoabdominal Aortic Aneurysm
Parallel Graft: Thoracoabdominal Aortic Aneurysm

- No RCT Publications
- Long-term Follow-up Is Missing
- Type I Endoleak Is a Concern
- Technical Standardization Is Missing
Parallel Graft: Thoracoabdominal Aortic Aneurysm

Suggestion of Technical Standardization

- **One Chimney**: need at least a health neck of **1.5cm** in length
- **Two Chimneys**: need at least a health neck of **2.0cm** in length
- **Three Chimneys**: need at least a health neck of **2.5cm** in length
- **Four Chimneys**: it is NOT advisable to do them all in antegrade flow
  - Proceed to one renal with Sandwich Periscope
Parallel Graft: Thoracoabdominal Aortic Aneurysm

Suggestion of Technical Standardization

- **First Step:** Endograft deployment.
- **Second Step:** Latex balloon accommodation.
- **Third Step:** Covered stent deployment
  (if you have used a self-expandable one).
- **Fourth Step:** Bare-metal self-expandable stent deployment inside of the covered stent (if you have used a self-expandable one).
Parallel Graft: Thoracoabdominal Aortic Aneurysm

Suggestion of Technical Standardization

✓ Self Expandable Covered Stents (SECS)

✓ Options in Size and Length
  - 1mm bigger than the Target Vessel
  - 2cm inside the Target Vessel

Overall w/ 50mm (CT & SMA) and 100mm (RA) in length
Conclusions

The Chimney/Sandwich Technique facilitates safe and effective aneurysm exclusion and target vessel revascularization in adverse anatomical scenarios, with sustained durability in midterm follow-up.
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