Why Selection of Bridging Stents is Vitally Important for FB-EVAR in Patients with Heritable Aortic Diseases

Gustavo S. Oderich, MD, FACS

John P. & Kathrine G. McGovern Distinguished Chair,
Professor of Surgery, Chief of Vascular and Endovascular Surgery,
Director of the Aortic Center

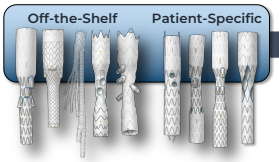
Department of Cardiothoracic & Vascular Surgery | UTHealth Houston McGovern Medical School

Faculty disclosures

G.S. Oderich

- **Consulting, research grants, scientific advisory board**
  WL Gore, Cook Medical Inc., GE Healthcare and Centerline Biomedical
- **Investigational use of devices**
  Cook Fenestrated and Branched Grafts
- **Special thank you**
  Research fellows: Lucas R. Kanamori MD, Bruno Schmid MD and Dora Babocs MD
  Research faculty: Ying Huang MD PhD
  Medical illustrations and graphics: David Factor and Chris Akers
  3D CTA Lab: Laura Ocasio MD and Thanila A. Macedo MD

FB-EVAR indications in patients with HTADs

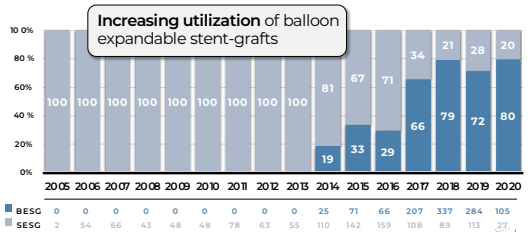


- Cook patient-specific TAAA platform
- Cook t-Branch® / TAAA+®
- Core TAMBE®
- Artivion E-nside®TAAA
- Medtronic Valiant® TAAA

Indications

- **FL enlargement** post TEVAR
- **Symptomatic**/ contained **ruptured** aneurysm
- **Stent-induced new entry tear**
- **Reoperative repair** after open DTA/TAAA repair
- Hostile surgical anatomy
- High clinical risk or complicated course following prior repair

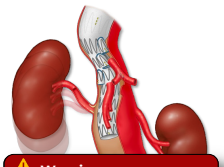
Stent selection for branches



Reasons for selecting BES

- **Smaller profile** (6-7Fr vs 7-8Fr)
- Improved **flexibility** (matching SES)
- Ability to **flare to 16 mm**
- Excellent **trackability** over small steerable sheaths
- **Optimal choices** of diameter and length
- **Safe and accurate deployment** (without sheath support)

Anatomical challenges



Warning

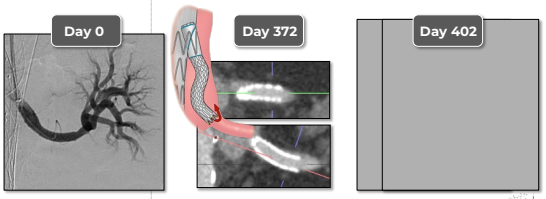
None of the studies analyzed extensive target artery stent outcomes for HTADs

- Limited luminal space
- Vessel tortuosity
- Cranial orientation
- Ostial stenosis
- Respiratory motion
- Hemodynamic forces
- Aortic remodeling
- Stent migration/ movement

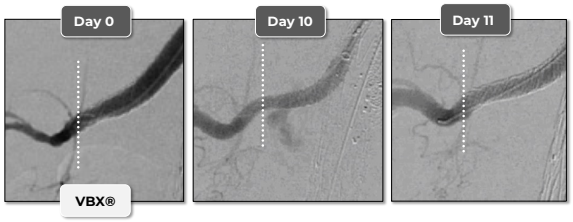
Time dependent outcomes for 2,300 branches

5-year Kaplan-Meier Estimates (% ± Standard Deviation)	All targets n = 2,300	BESG n = 1,095	SESG N = 1205	Log-rank
Primary patency	90±1	91±3	90±2	.14
Secondary patency	94±1	95±2	93±1	.41
Freedom from target vessel:				
Any instability	86±1	**78±4**	**88±1**	**.006**
Type IC or IIIC Endoleak	93±1	**87±3**	**97±1**	**<.001**
Secondary intervention	91±1	**83±4**	**95±1**	**.0002**
Follow up (months)	21± 22	**14±13**	**26±25**	**<.001**

Progressive target artery enlargement leading to Type IC endoleak

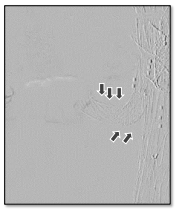


Retrograde stent migration

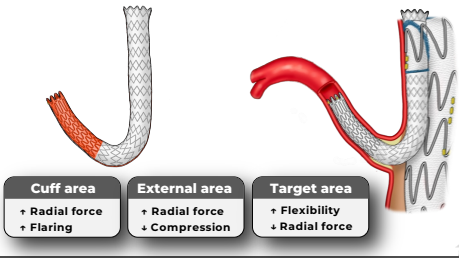


Target endokeaks with balloon expandable stent-grafts

- **Inadequate oversizing** and post-dilatation
- **Short landing zone**
- **Progressive vessel enlargement** due to excessive radial force
- **Lack of conformability** with continuous native vessel motion
- Retrograde **migration**

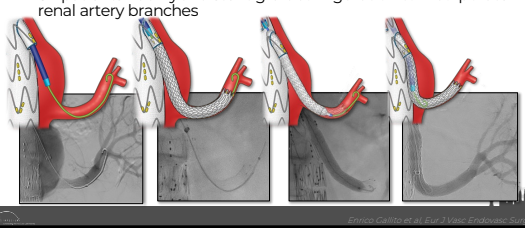


Ideal stent characteristics



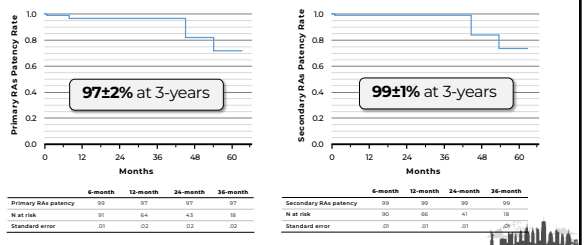
Hybrid bridging stent-graft

- 584 patients treated by FB-EVAR in two centers (2016 to 2022)
- 84 patients had hybrid stent graft configuration to incorporate 126 renal artery branches



Enrico Gallitto et al. Eur J Vasc Endovasc Surg 2024

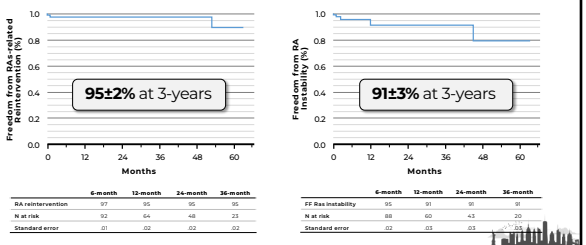
Renal artery patency



	6-month	12-month	24-month	36-month
Primary RAs patency	99	97	97	97
N at risk	91	64	43	18
Standard error	.01	.02	.02	.02

	6-month	12-month	24-month	36-month
Secondary RAs patency	99	99	99	99
N at risk	90	66	41	18
Standard error	.01	.01	.01	.01

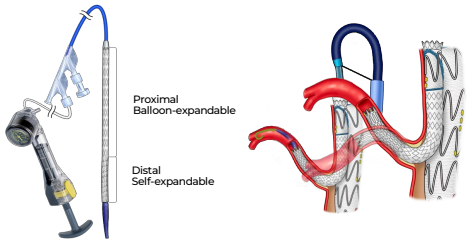
Renal artery reintervention and instability



	6-month	12-month	24-month	36-month
RA reintervention	97	95	95	95
N at risk	92	64	48	23
Standard error	.01	.02	.02	.02

	6-month	12-month	24-month	36-month
FF Ras instability	95	91	91	91
N at risk	88	60	43	20
Standard error	.02	.03	.03	.03

Hybrid stent concept



EVICTUS STUDY

EndoVascular Intervention in patients with Connective TissUe diSease

- 18 clinical sites
- US, UK, European Union, China and New Zealand

171 patients

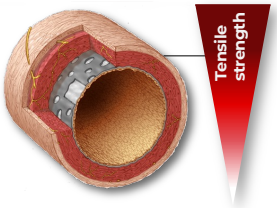
Endovascular approach

	MS n = 142	LDS n = 17	vEDS n = 12
Proximal landing zone in surgical graft	**56%**	**59%**	42%
Distal landing zone in surgical graft	15%	6%	8%
FBEVAR	**17%**	**47%**	**34%**
Parallel grafts	3%	0%	0%
Debranching	31%	12%	17%

- 30-day or in-hospital mortality: **3%**
- Primary technical success: 98%
- Secondary interventions: 54%
  - Branch stenting: 3% MS, 15% LDS and 19% vEDS

No multi-center data on outcomes of FB-EVAR HTADs
No analysis of bridging stent type

Genotype-surgical phenotype correlation



No abnormality

FBN 1
FNA 1 null
TGFBR2
TGFBR1
SMAD3
COL3A1 null
COL3A1 large amino acid substitution

	Balloon Expandable	Self Expandable
Profile, trackability, etc	👍	👎
Accurate deployment	👍	👎

Overall SE or BE bridging stent-graft performance has been favorable
Probably best to use SESG whenever possible in patients with HTADs

Thank You!

Department of Cardiothoracic & Vascular Surgery | UTHealth Houston McGovern Medical School

gustavo.oderich@uth.tmc.edu
go4aorta@gmail.com
@GustavoOderich
go4aorta