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**2024**

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# Quel stent couvert pour les fenêtrées ?

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**UNIVERSITÀ  
DI TORINO**



AZIENDA OSPEDALIERO - UNIVERSITARIA  
Città della Salute e della Scienza di Torino

## Disclosure

Speaker name: Prof. Fabio Verzini

- I have the following potential conflicts of interest to report:
  - X Receipt of grants/research support from Cook Medtronic**
  - X Receipt of honoraria and travel support from Jotec Terumo  
Bayer Gore**
  - Participation in a company-sponsored speaker bureau
  - Employment in industry
  - Shareholder in a healthcare company
  - Owner of a healthcare company
- I do not have any potential conflict of interest

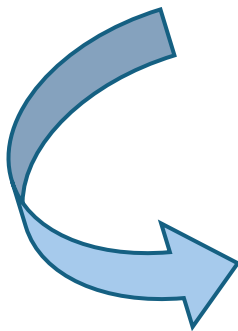


## Reporting standards for endovascular aortic repair of aneurysms involving the renal-mesenteric arteries

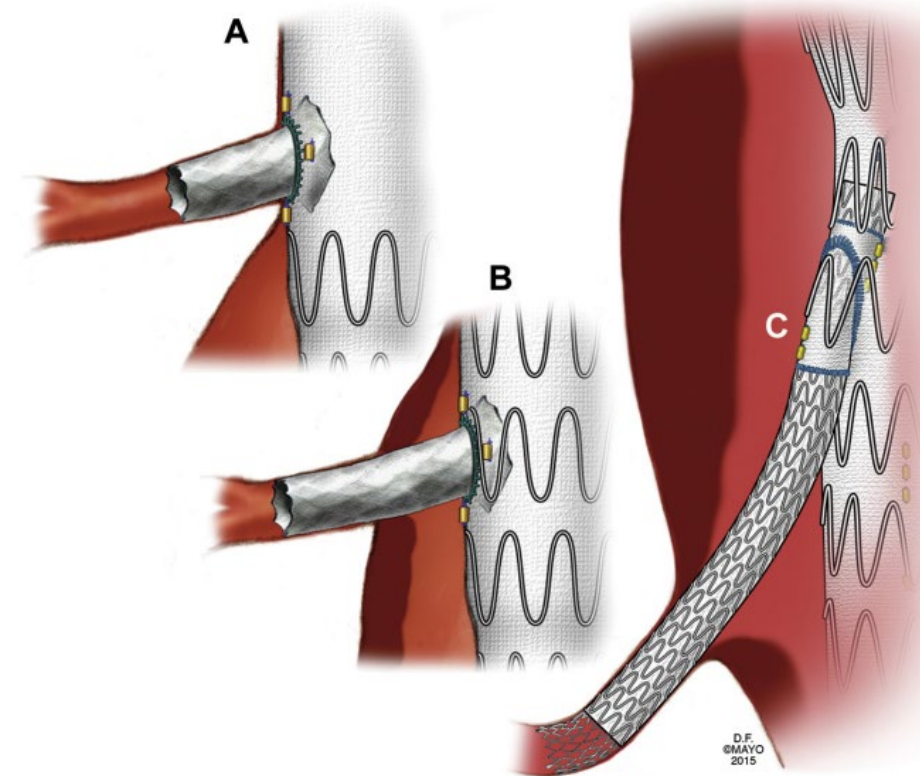
Gustavo S. Oderich, MD (Chair),<sup>a</sup> Thomas L. Forbes, MD (Co-Chair),<sup>b</sup> Rabih Chaer, MD,<sup>c</sup> Mark G. Davies, MD, PhD, MBA,<sup>d</sup> Thomas F. Lindsay, MD,<sup>b</sup> Tara Mastracci, MD,<sup>e</sup> Michael J. Singh, MD,<sup>c</sup> Carlos Timaran, MD,<sup>f</sup> and Edward Y. Woo, MD,<sup>g</sup> Writing Committee Group, *Houston, San Antonio, and Dallas, Tex; Toronto, Ontario, Canada; Pittsburgh, Pa; London, United Kingdom; and Washington, D.C.*

Techniques of endovascular incorporation of renal-mesenteric arteries require use of bridging stents (BS) to connect the aortic device to each specific target artery

**The BS must ideally manage a combination of different characteristics**



- Sufficient radial force
- Adequate flexibility
- Smooth transition at its distal edge to the target vessel



# BALLOON-EXPANDABLE (BESGs)

- More radial force
- Smaller profile
- More precise deployment



# SELF-EXPANDABLE (SESGs)

- More flexibility
- More conformability



Appropriate selection of BSG for target vessels in branched and fenestrated endovascular aortic repair is critical for technical success and durability



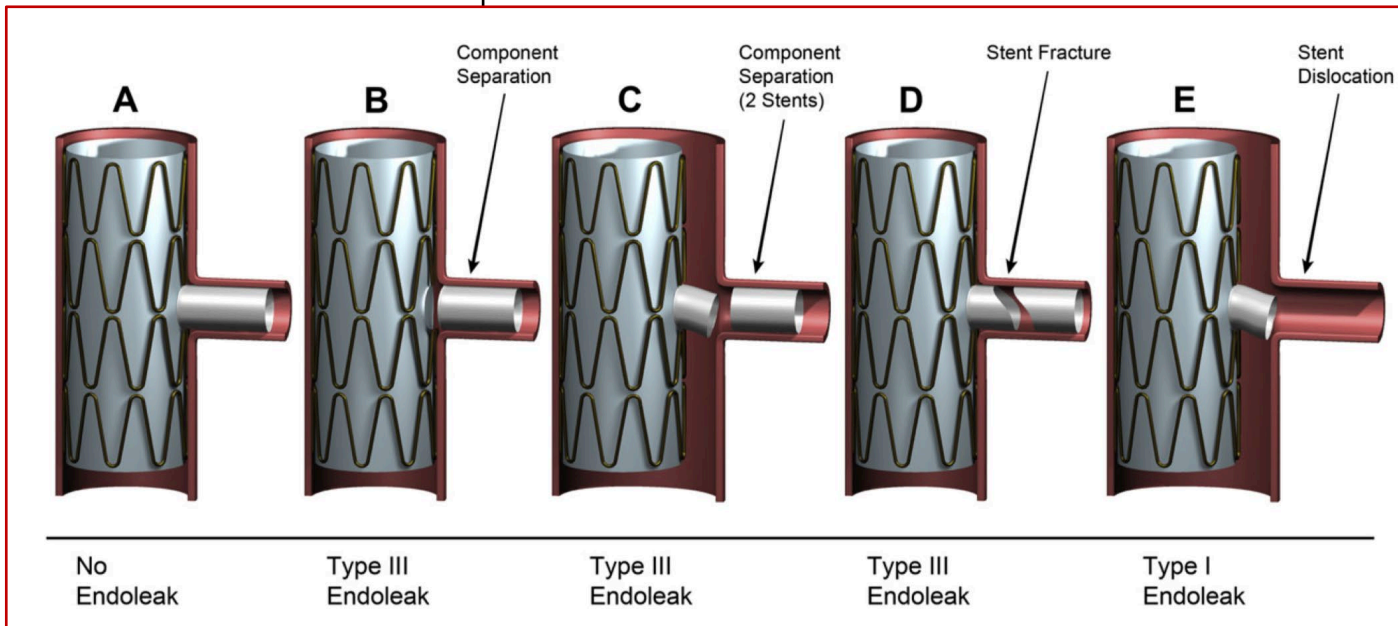
# Durability of branches in branched and fenestrated endografts

Tara M Mastracci<sup>1</sup>, Roy K Greenberg, Matthew J Eagleton, Adrian V Hernandez

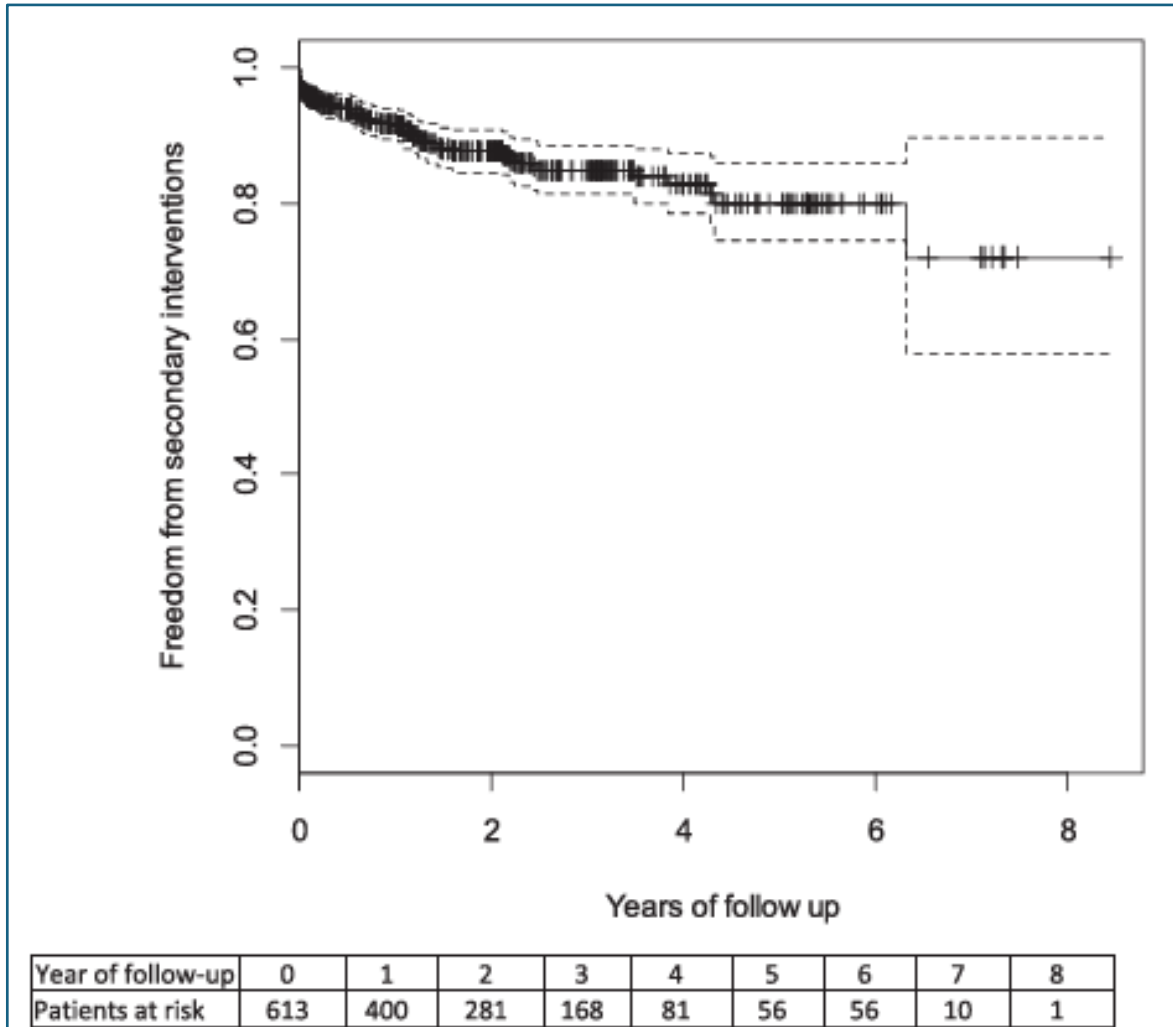
Single-center prospective study  
2001-2010  
650 patients – 1679 TV  
Median follow-up at 3 years  
**iCAST/Advanta V12**

**Branch instability** →

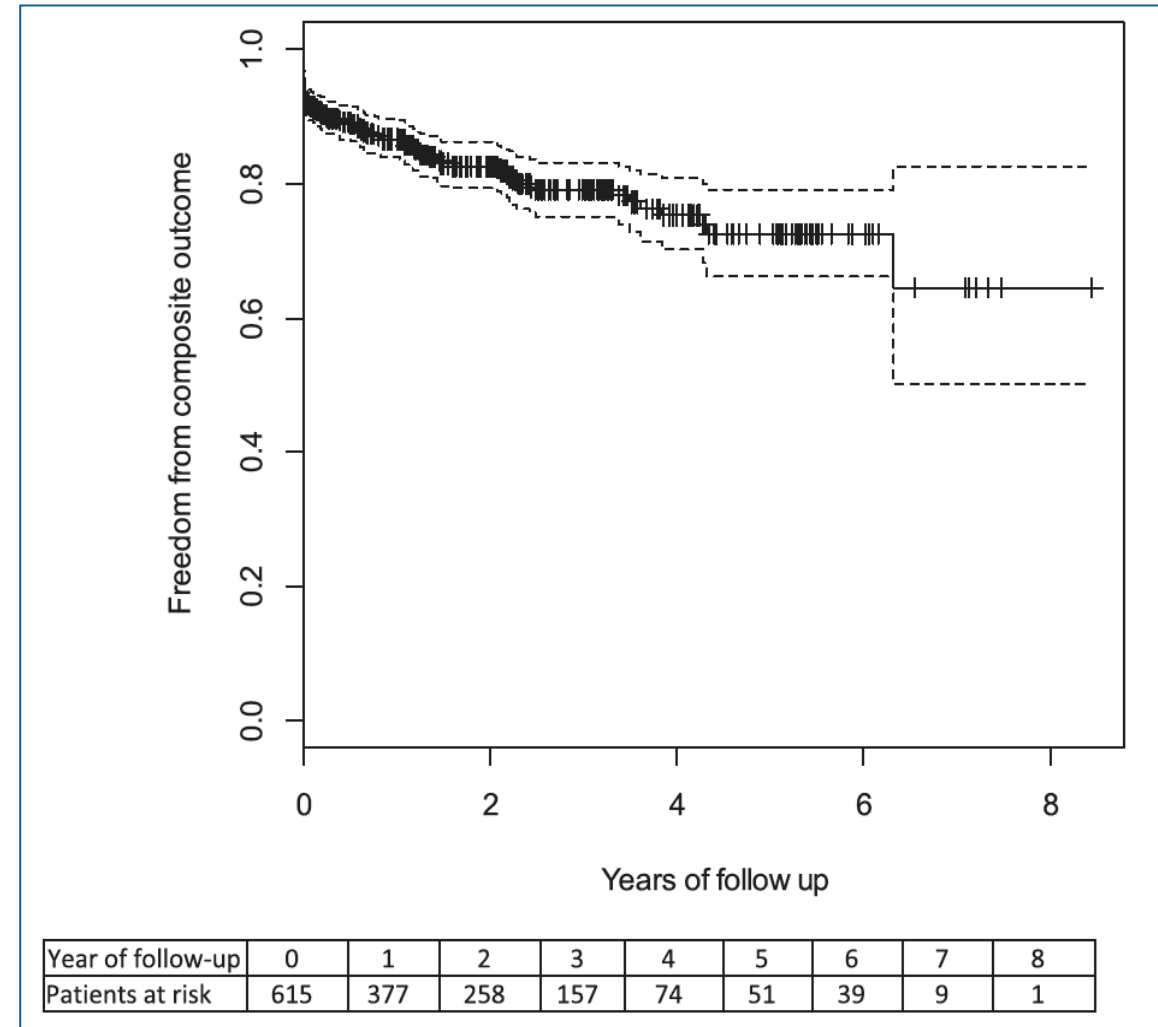
- occlusion
- migration
- any secondary intervention branch-related (fracture, endoleak...)



FREEDOM FROM SECONDARY INTERVENTION:  
**89% at 5 years**

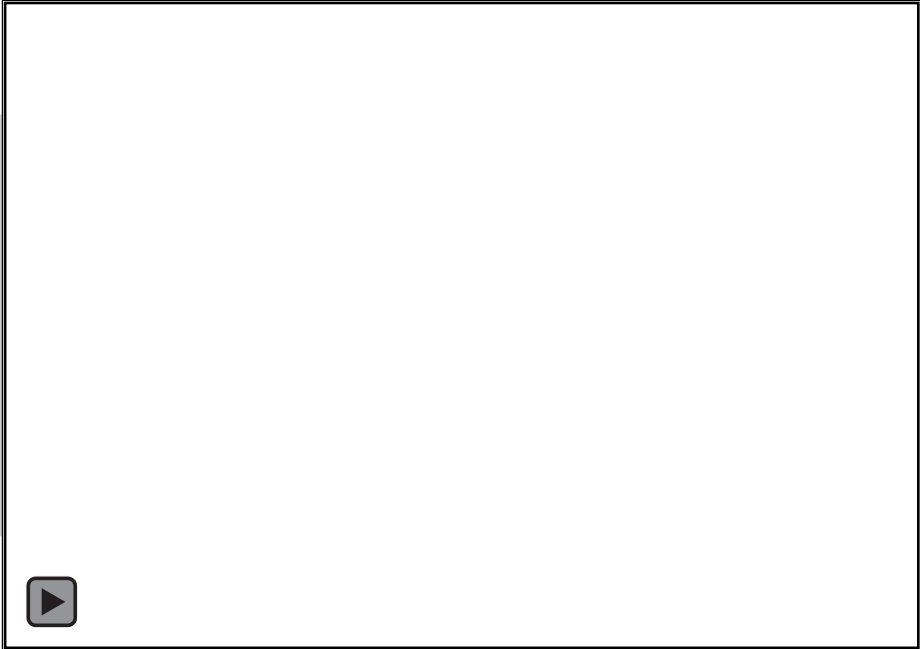
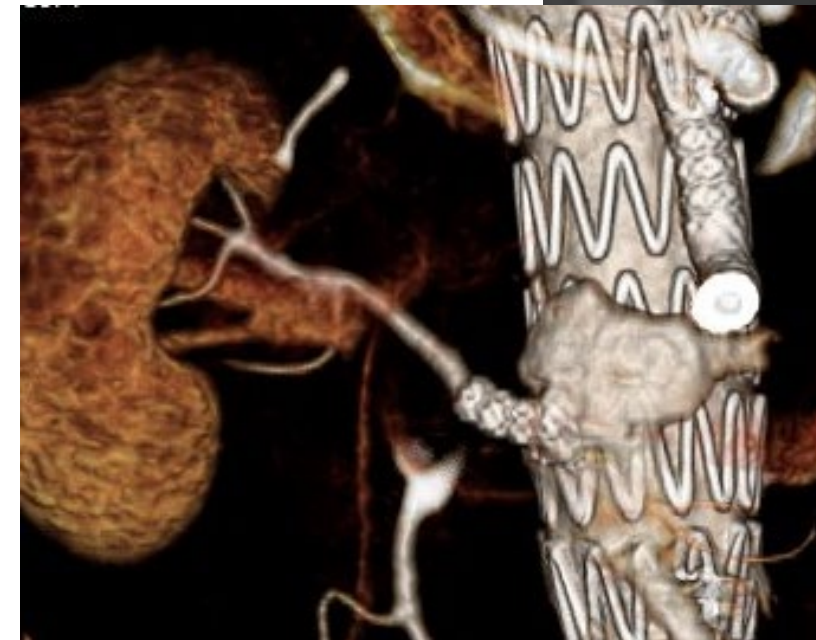
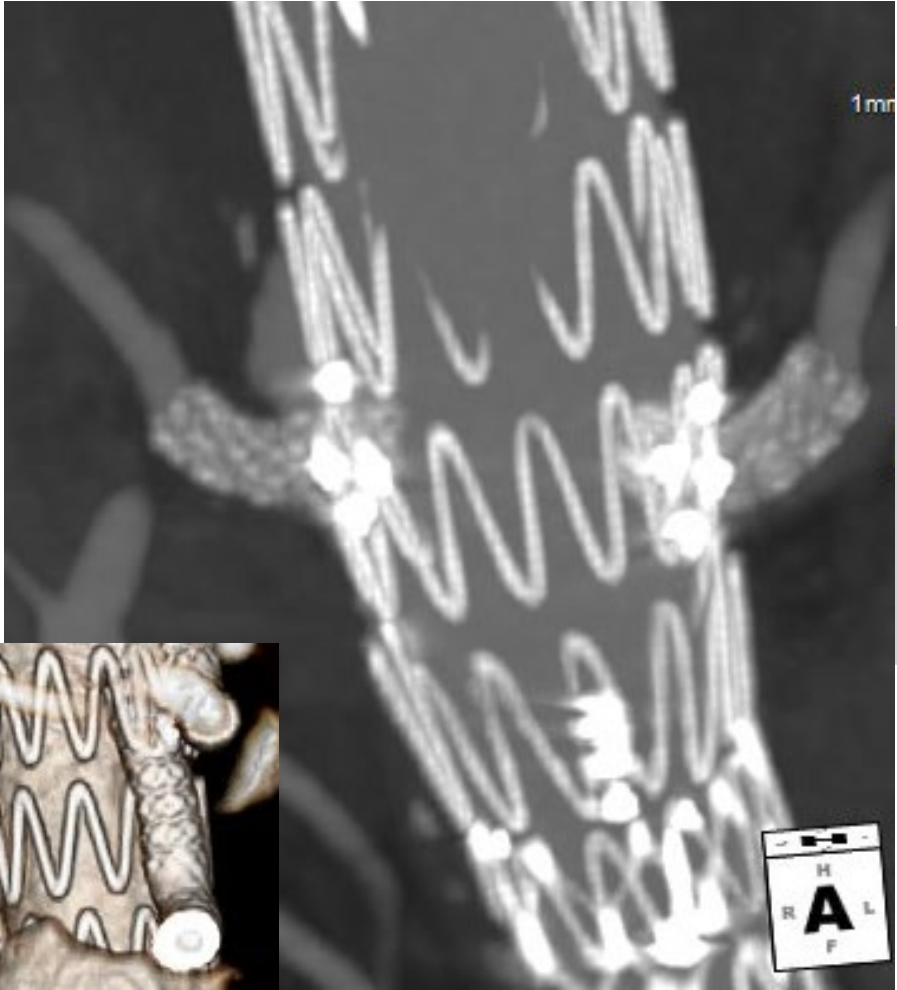
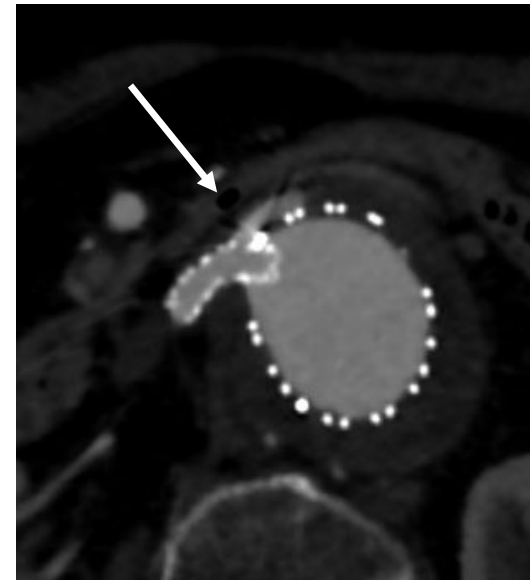


FREEDOM FROM BRANCH INSTABILITY:  
**84% at 5 years**



Bridging stents in F/BEVAR are durable & are rarely the cause of patient death

# CLINICAL CASES

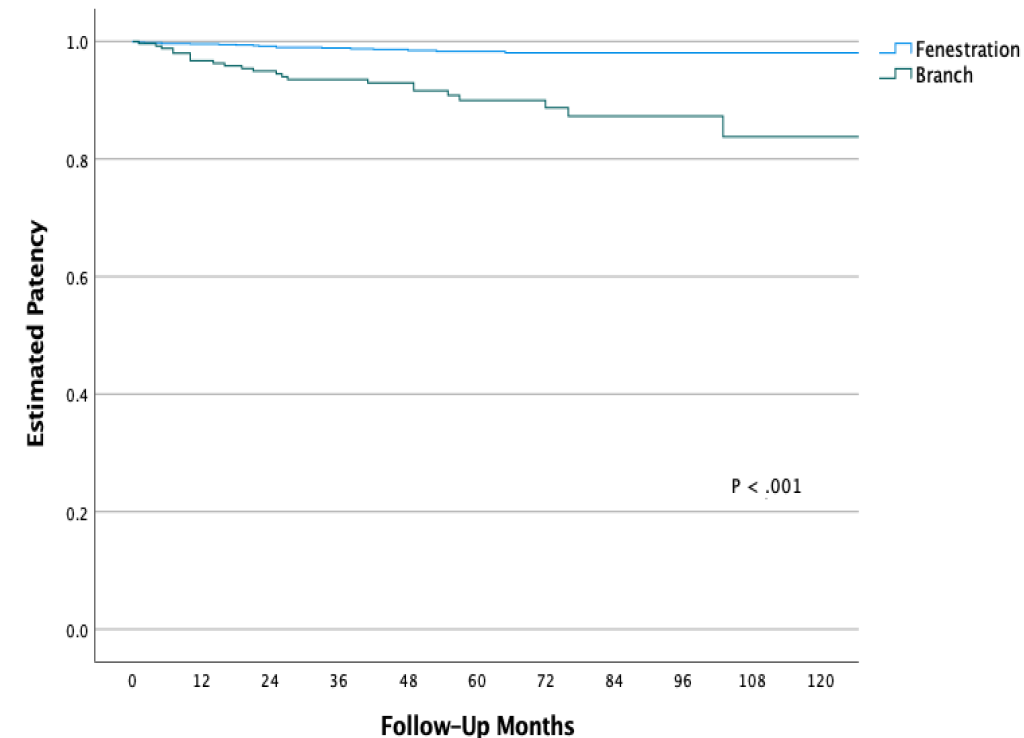


# Editor's Choice – Long Term Outcomes of the Advanta V12 Covered Bridging Stent for Fenestrated and Branched Endovascular Aneurysm Repair in 1 675 Target Vessels

Eur J Vasc Endovasc Surg (2023) 66, 313–321

Athanasios Katsargyris<sup>\*</sup>, Natasha Hasemaki, Pablo Marques de Marino, Melad Abu Jiries, Nargis Gafur, Eric L.G. Verhoeven

Department of Vascular and Endovascular Surgery, General Hospital & Paracelsus Medical University, Nuremberg, Germany



## • Fenestrations

- $98.3 \pm 0.4\%$  at 5 years
- $98.1 \pm 0.5\%$  at 8 years

## • Branches

- $90.0 \pm 2.2\%$  at 5 years
- $87.3 \pm 2.9\%$  at 8 years

## Renal arteries

### • Fenestrations

- $98.5 \pm 0.4\%$  at 5 years
- $98.2 \pm 0.5\%$  at 8 years

### • Branches

- $83.5 \pm 4.3\%$  at 5 years
- $77.3 \pm 5.9\%$  at 8 years



New open cell stent design/crimping process on balloon

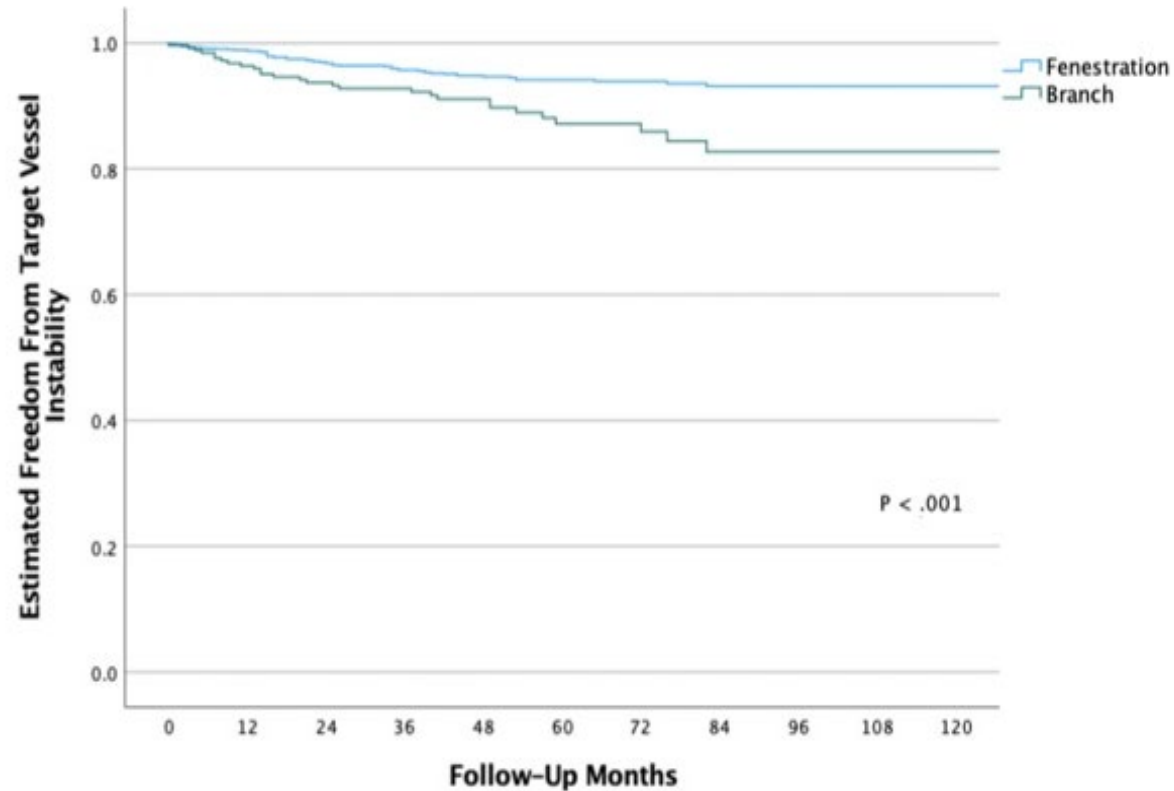
- ✓ Increased flexibility
- ✓ Greater radial strength
- ✓ Lower recoil
- ✓ Higher stent retention

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Department of Vascular and Endovascular Surgery, General Hospital & Paracelsus Medical University, Nuremberg, Germany



- Fenestrations
  - 94.1 ± 0.8% at 5 years
  - 93.2 ± 0.9% at 8 years
- Branches
  - 87.2 ± 2.5% at 5 years
  - 82.7 ± 3.5% at 8 years



# BeGraft Evolution

**BeGraft**  
peripheral



2013

Launch BeGraft  
peripheral

**BeGraft**  
peripheral



2015

Launch BeGraft  
peripheral  
- modified design -

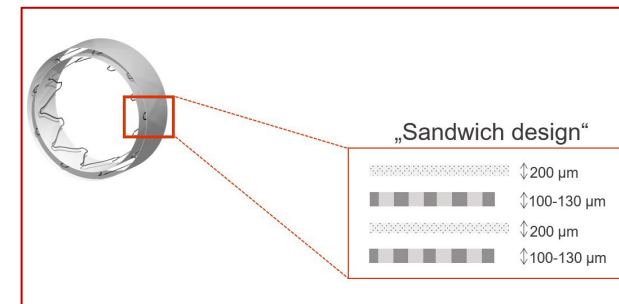
**BeGraft<sup>+</sup>**  
peripheral



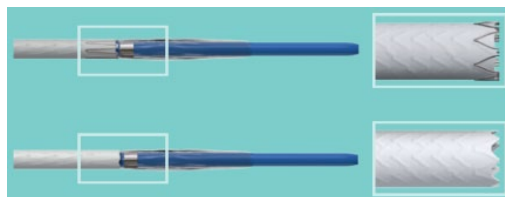
2017

Launch BeGraft  
peripheral PLUS

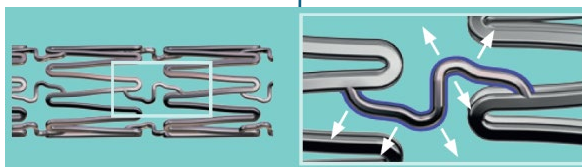
Increased radial  
force and kink  
resistance



PTFE fixed at  
both stent ends



Increased connector width to  
improve longitudinal stiffness



Initial Thickness (100 µm)

Modified Thickness (200 µm)

Increased PTFE  
thickness

# Outcome of the Be Graft Bridging Stent in Fenestrated Endovascular Aortic Repair in a High-Volume Single Center and an Overview of Current Evidence

Daniel Becker<sup>1</sup>, Carlota Fernandez Prendes<sup>1</sup>, Jan Stana<sup>1</sup>, Kostas Stavroulakis<sup>1</sup>, Nikolaos Konstantinou<sup>1</sup>, Ahmed Ali<sup>1</sup>, Barbara Rantner<sup>1</sup>, Nikolaos Tsilimparis<sup>1</sup>

Retrospective single center study  
2018-2022  
113 patients - 440 TV (361 with BeGraft)  
Median follow-up was 20 months

Technical success was **99.4 %** (359/361)

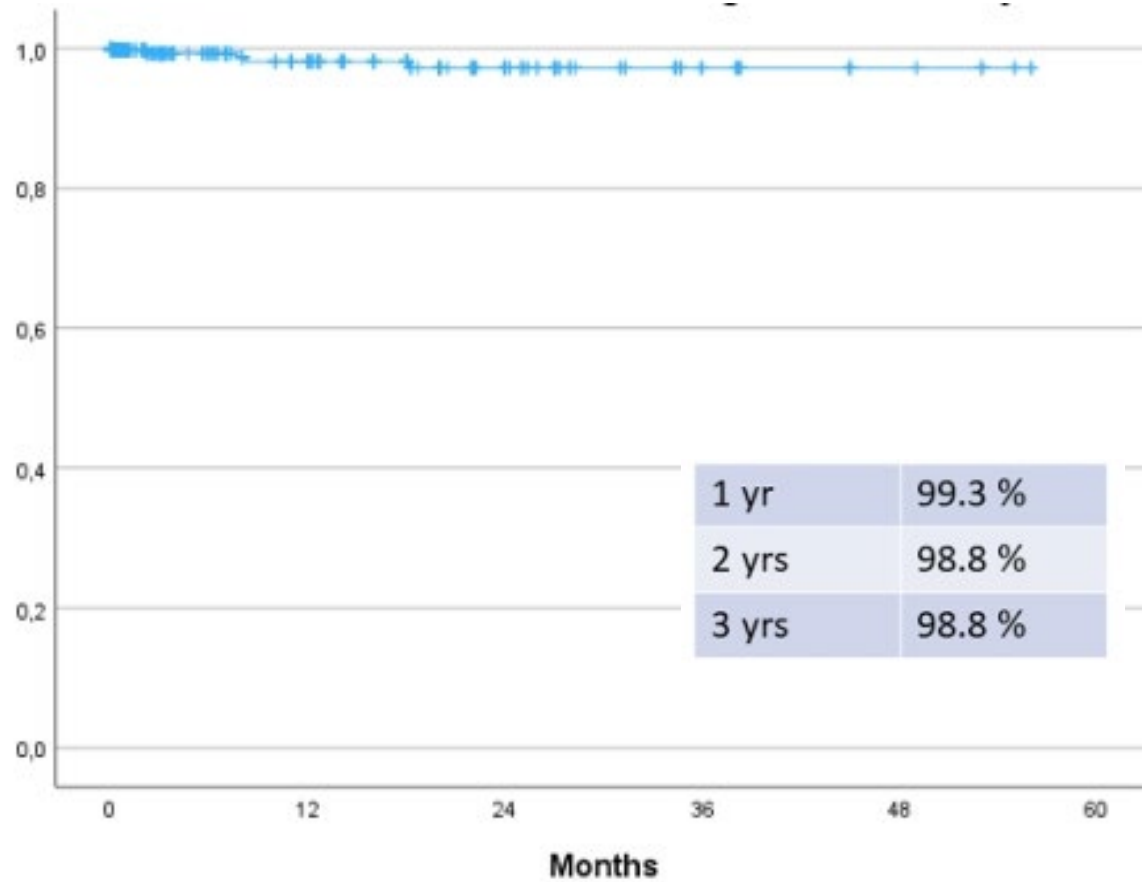
## 30-DAY OUTCOMES

Target vessel instability	0.27 % (1/361)
Re-Intervention	5.3 % (6/113)
- Target vessel related	1
- Access related	4
- Other	1
Mortality	0.9 % (1/113)

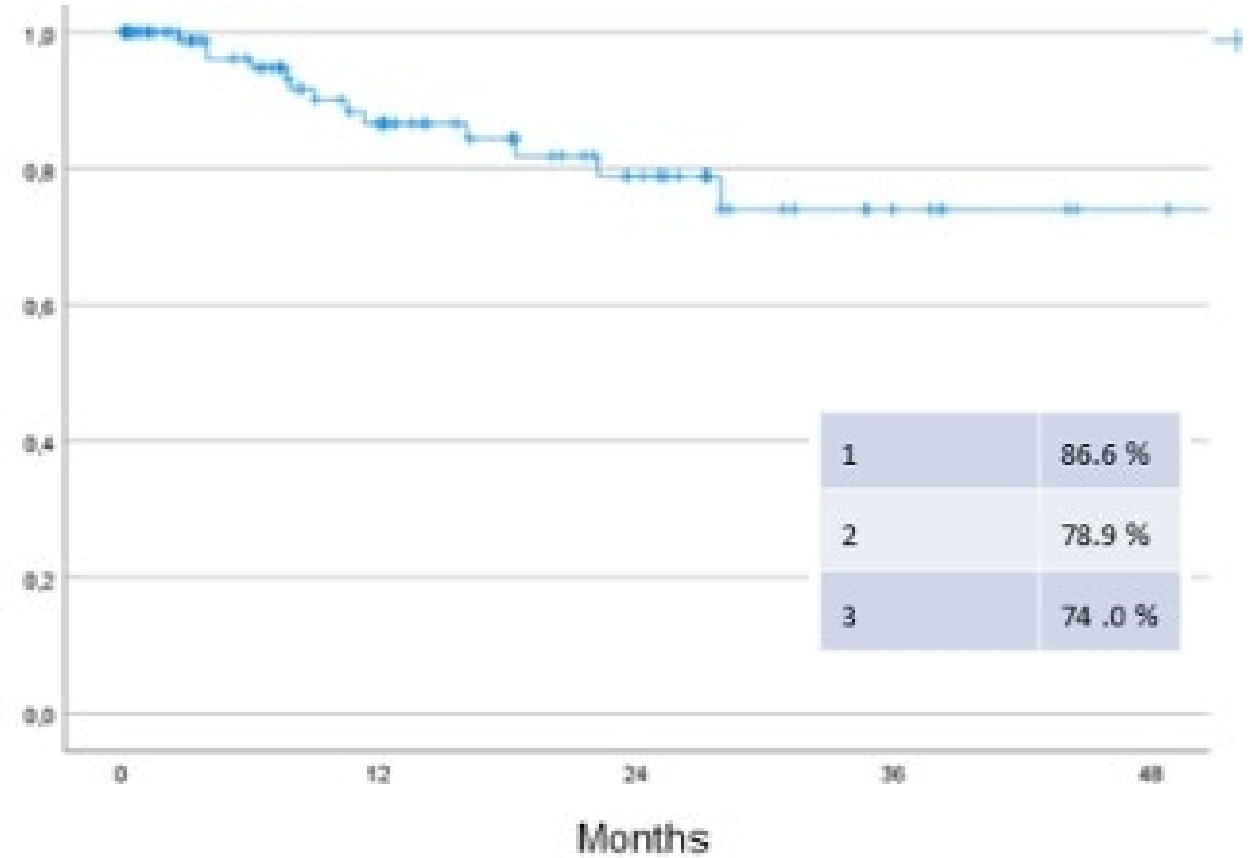
## FOLLOW-UP OUTCOMES

→	<b>0.8 % (3/361)</b>
→	<b>9.7 % (11/112)</b> 3
→	<b>5.3 % (6/112)</b>

## FREEDOM FROM TV INSTABILITY



## FREEDOM FROM RE-INTERVENTION

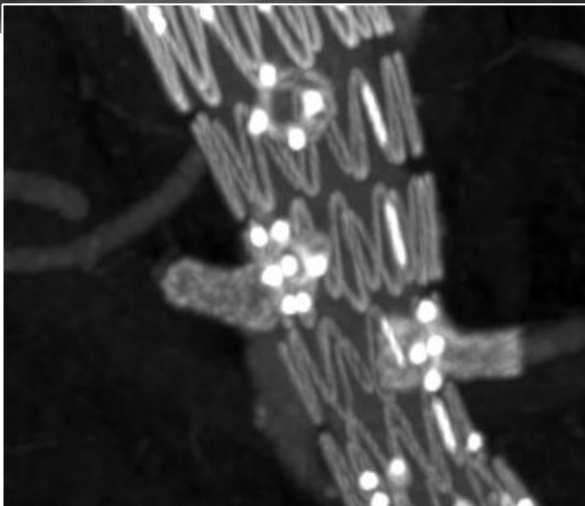


Data of this study underline the promising early- and midterm outcomes of BeGraft device as bridging stent in FEVAR with a low rate of target vessel instability. Follow up in an aortic outpatient clinic including clinical and radiological investigation is mandatory to detect problems and perform early re-intervention.

# CLINICAL CASES

EL IN COOK CUSTOM-MADE ENDOPROSTHESIS FOR juxta-renal  
AAA

**BeGraft 8X37 SMA, 9X27 CT, 7X27 left RA, 7X27 right RA**



# Viabahn VBX

- Non-supported stent-segments
  - ↑ Flexibility & conformability
- Can be flared up to 16mm
- Lengths up to 79mm

NOW  
**6Fr**  
compatible  
GREATER  
VERSATILITY

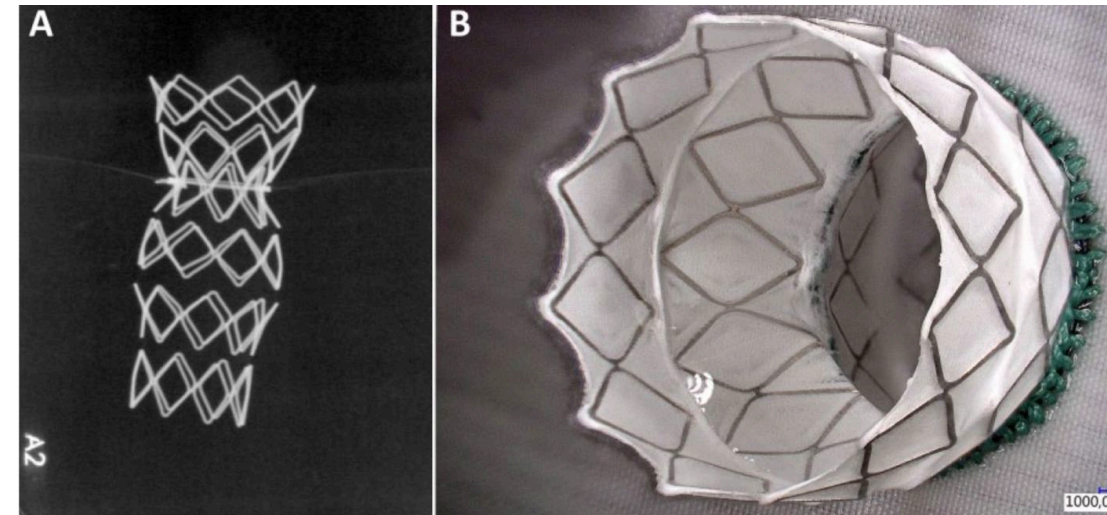


> [J Endovasc Ther.](#) 2019 Jun;26(3):361-368. doi: 10.1177/1526602819842569. Epub 2019 Apr 11.

## In Vitro Evaluation of the Gore Viabahn Balloon-Expandable Stent-Graft for Fenestrated Endovascular Aortic Repair

Giovanni Federico Torsello <sup>1 2</sup>, Monika Hertel <sup>2 3</sup>, Markus Müller <sup>4</sup>, André- Frank <sup>4</sup>,  
Giovanni B Torsello <sup>2</sup>, Martin Austermann <sup>2</sup>

- Resistance to fracture after implantation and flaring in the FEVAR model
- Higher pullout force resistance when compared to other devices

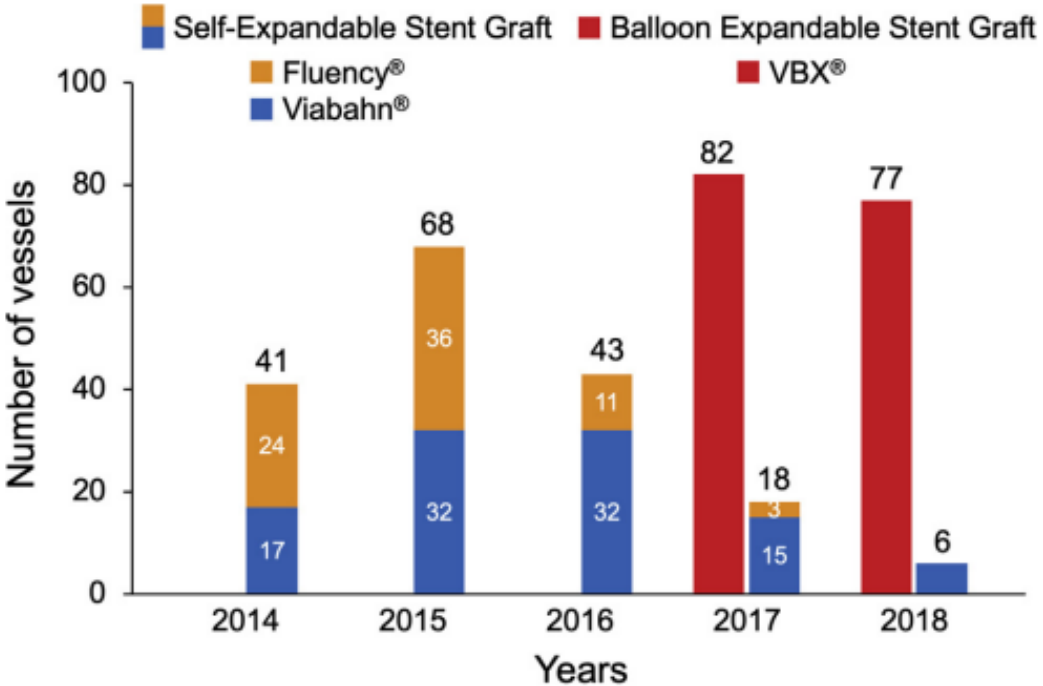




# Outcomes of directional branches using self-expandable or balloon-expandable stent grafts during endovascular repair of thoracoabdominal aortic aneurysms

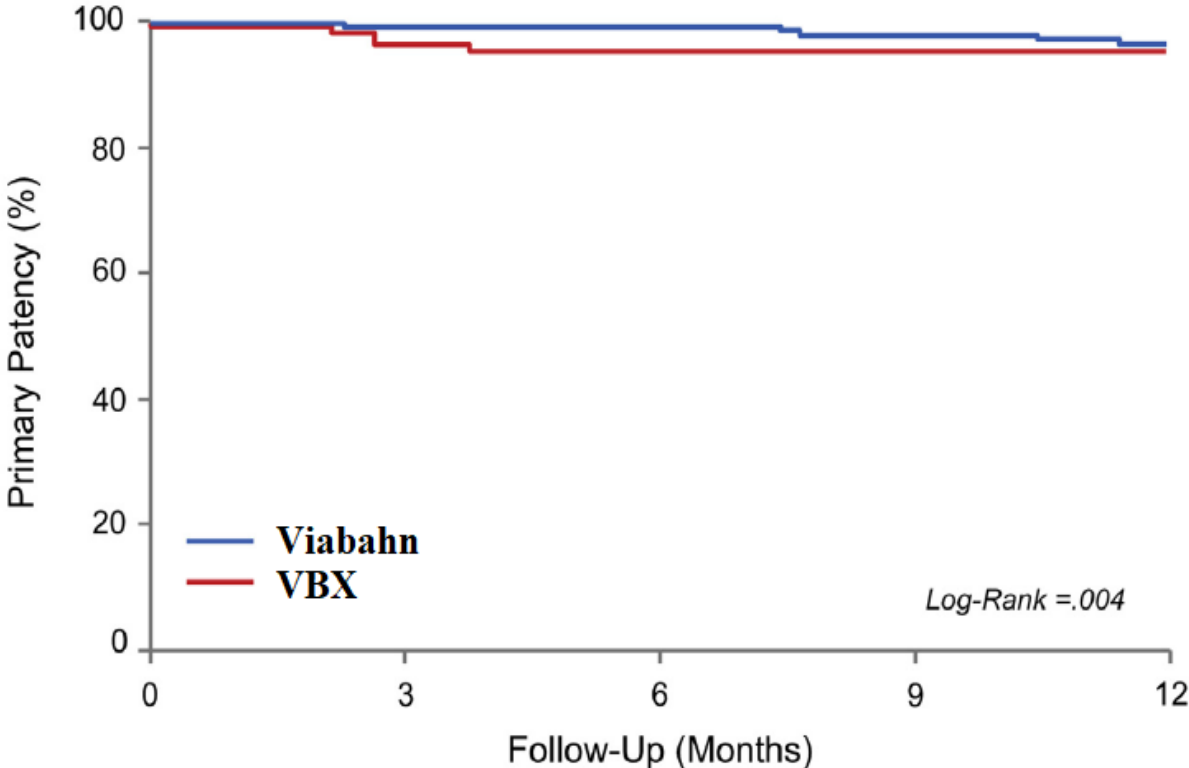
Emanuel R. Tenorio, MD, PhD, Jussi M. Kärkkäinen, MD, PhD, Bernardo C. Mendes, MD, Randall R. DeMartino, MD, Thanila A. Macedo, MD, Alisa Diderrich, RN, Jan Hofer, RN, and Gustavo S. Oderich, MD, Rochester, Minn

Prospective single center study  
 2014-2018  
 126 patients - 335 TV (159 VBX; 176 Viabahn)  
 F/BEVAR  
 Mean follow-up 23 months SESG vs 8 months BESG



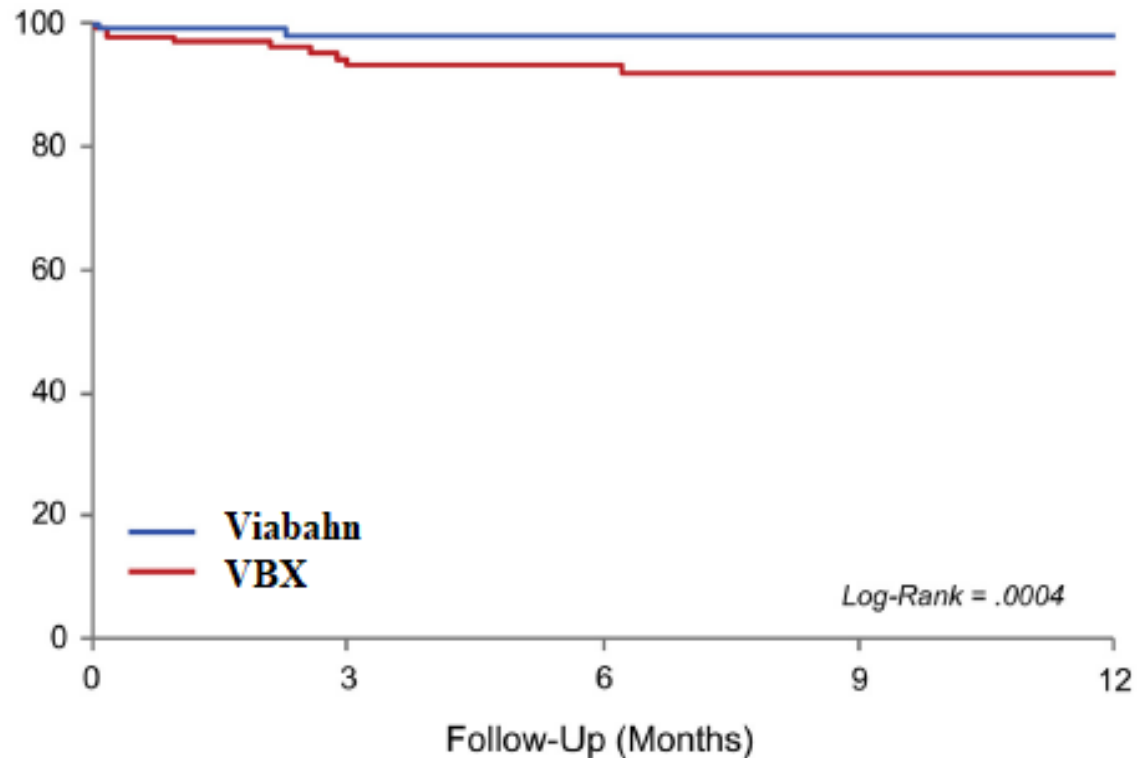
**Fig 1.** Evolution of the use of a self-expandable stent graft (SESG) over time in relation to the use of a balloon-expandable stent graft (BESG).

Technical success was achieved in 99%



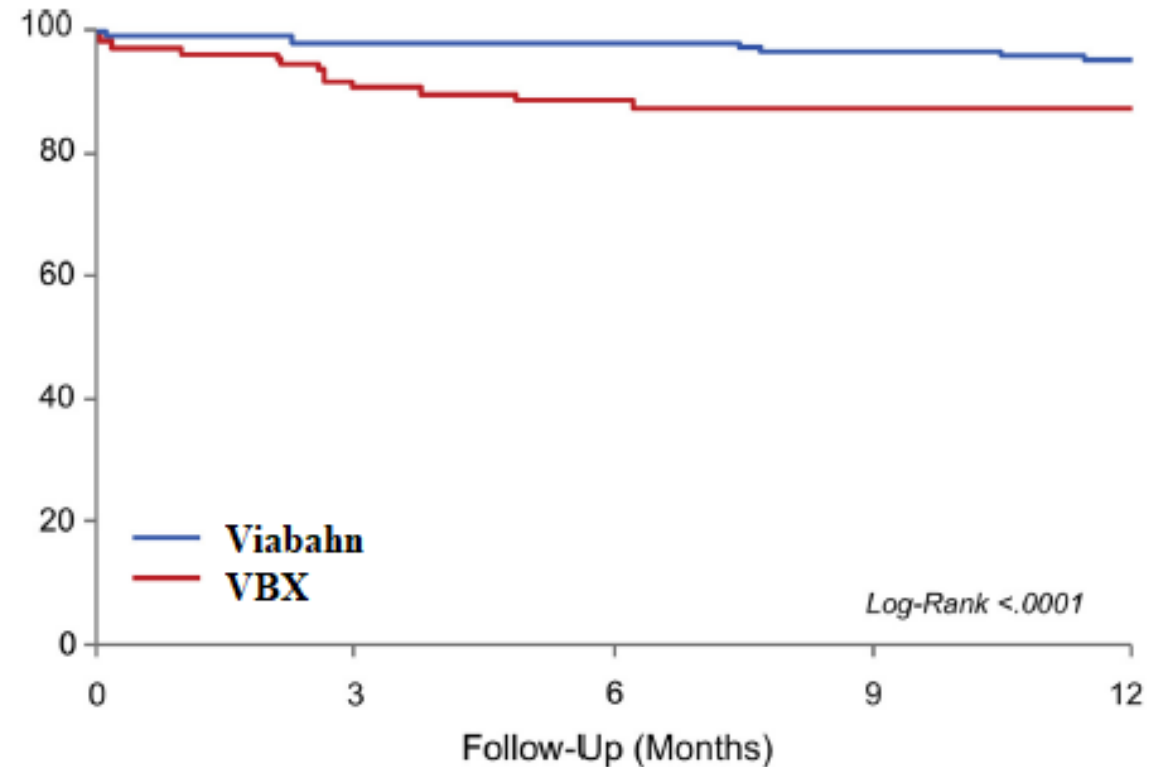
→ VBX lower patency rates vs Viabahn

## FREEDOM FROM ENDOLEAKS



→ VBX higher endoleak rates vs Viabahn

## FREEDOM FROM INSTABILITY



→ VBX higher instability rates vs Viabahn

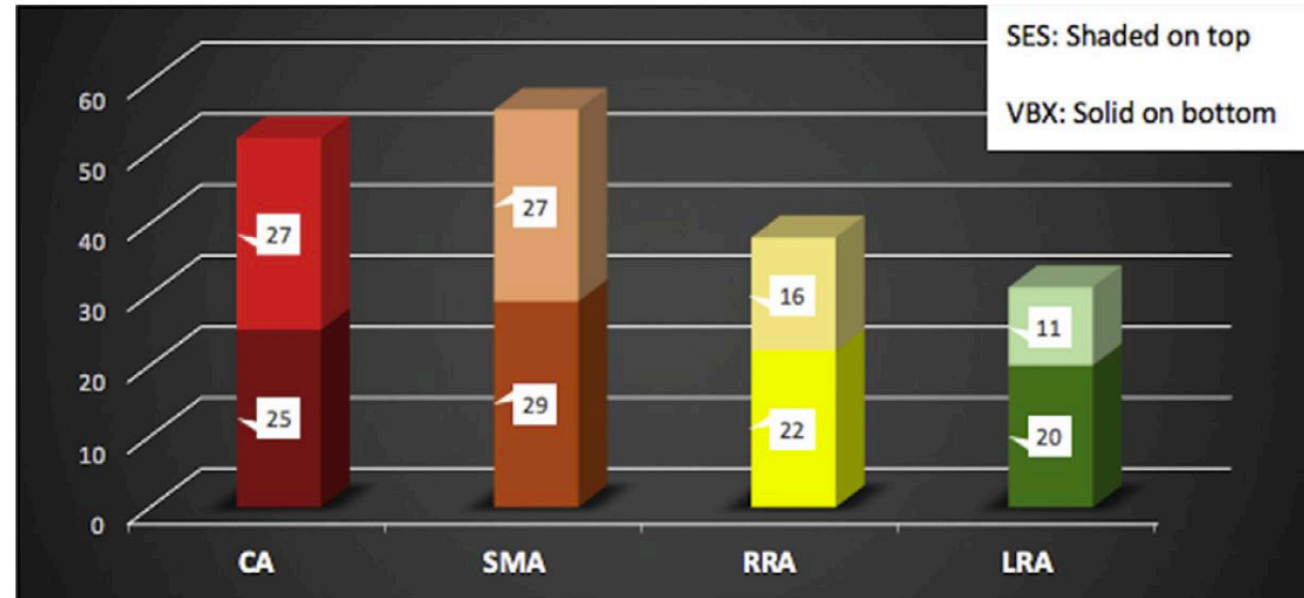
VBX higher TV Instability mainly due to Type Ic endoleaks

**Conclusions:** Directional branches were associated with high technical success and low rates of stent occlusion, independent of stent type. However, primary patency, freedom from TAI, and freedom from type IC or type IIC endoleaks was lower for BESGs compared with SESGs. (J Vasc Surg 2020;71:1489-502.)

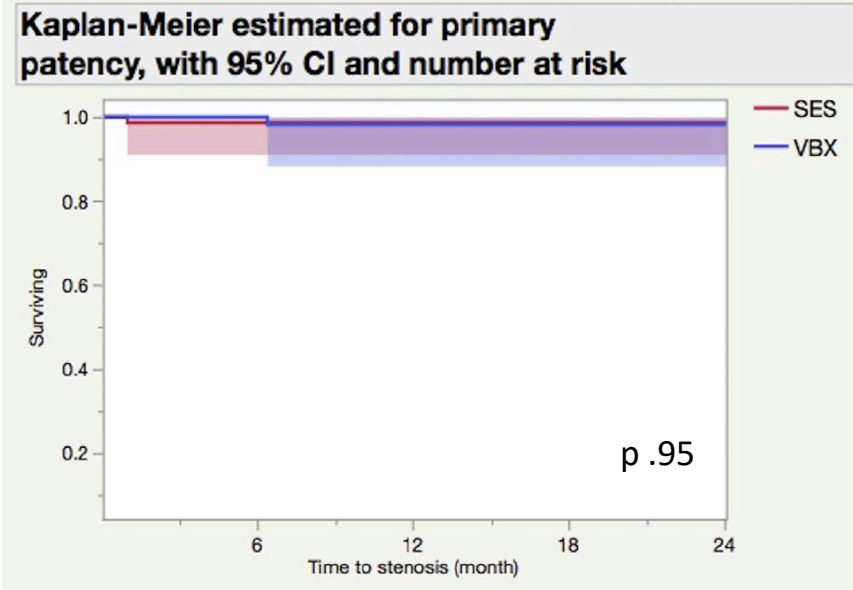
# Performance of Viabahn balloon-expandable stent compared with self-expandable covered stents for branched endovascular aortic repair

Fernando Motta<sup>1</sup>, F Ezequiel Parodi<sup>1</sup>, Martyn Knowles<sup>1</sup>, Jason R Crowner<sup>1</sup>, Luigi Pascarella<sup>1</sup>, Katharine L McGinagle<sup>1</sup>, William A Marston<sup>1</sup>, Melina R Kibbe<sup>1</sup>, Elad Ohana<sup>1</sup>, Mark A Farber<sup>2</sup>

Prospective non randomized study  
2012-2019  
263 pts – 977 TV (179 branches)  
VBX vs Fluency/Viabahn  
Median follow-up at 17 months



## PRIMARY PATENCY

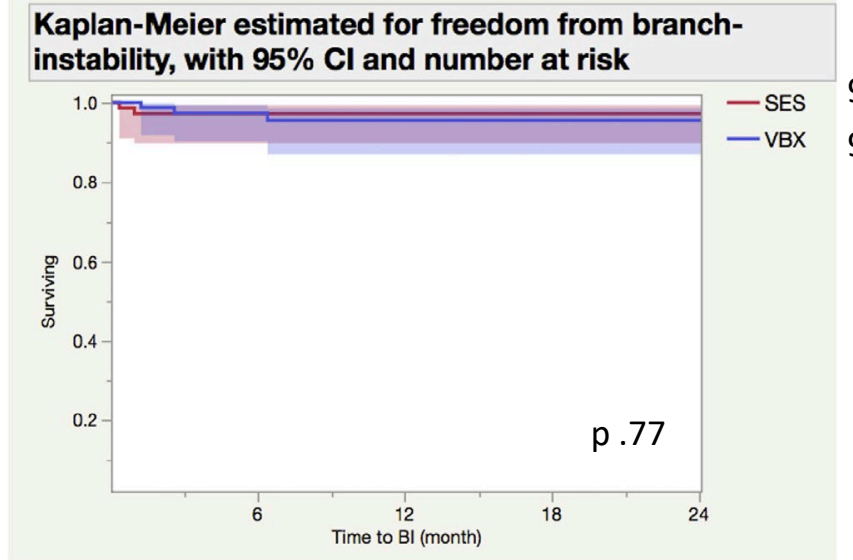


	Time, months	0	6	12	18	24
SES	N at risk	81	61	57	53	51
	Percentage	100%	98.6%	98.6%	98.6%	98.6%
	SE	0%	1%	1%	1%	1%
	N at risk	96	57	19	14	6
VBX	Percentage	100%	100%	98.1%	98.1%	98.1%
	SE	0%	0%	2%	2%	2%

N: number; SES: self-expandable stent ; VBX: Gore Balloon expandable Viabahn  
Log-rank: 0.95

→ Similar patency rates for VBX & SES

## FREEDOM FROM BRANCH INSTABILITY



	Time, months	0	6	12	18	24
SES	N at risk	81	60	56	52	50
	Percentage	100%	97.2%	97.2%	97.2%	97.2%
	SE	0%	2%	2%	2%	2%
VBX	N at risk	96	56	19	14	6
	Percentage	100%	97.4%	95.6%	95.6%	95.6%
	SE	0%	2%	2%	2%	2%

N: number; SES: self-expandable stent ; VBX: Gore Balloon expandable Viabahn

Log-rank: 0.77

→ Similar instability rates for VBX & SES

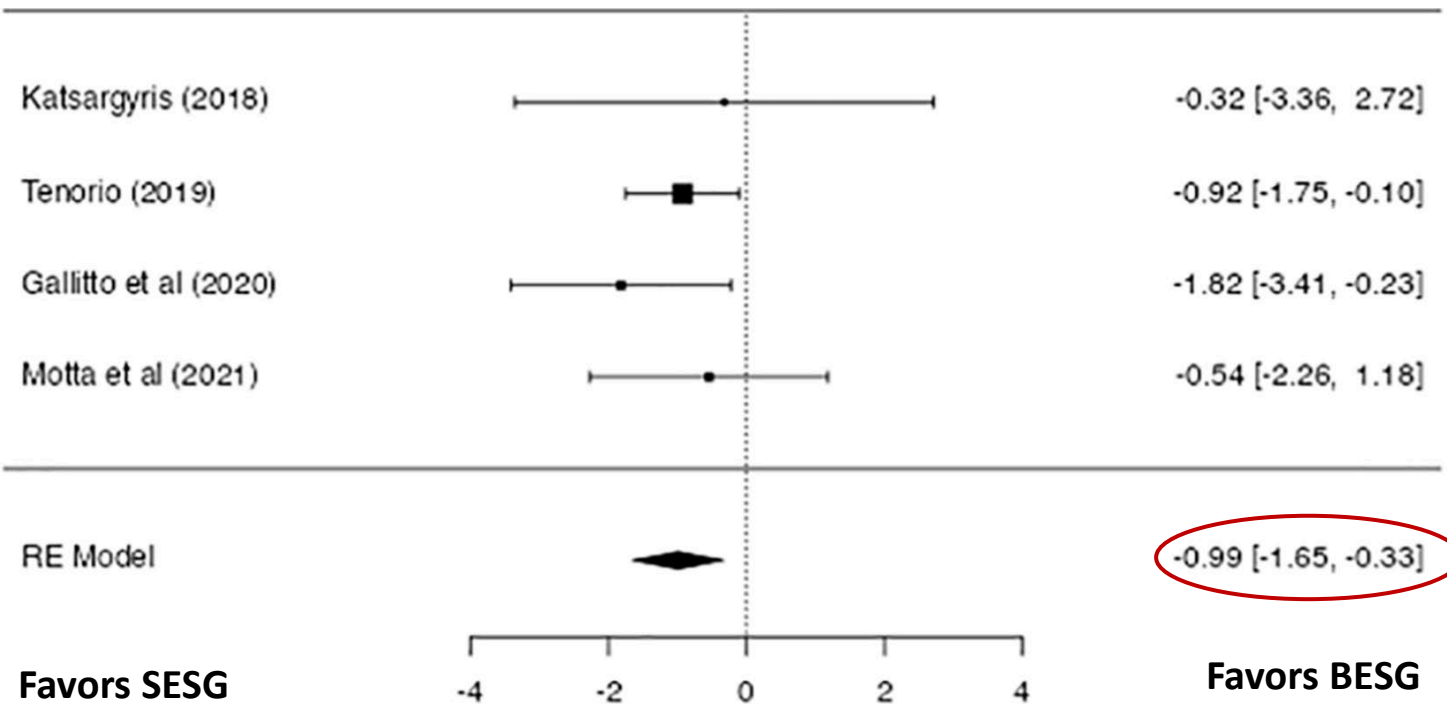
**Conclusions:** This initial experience with VBX stents demonstrated excellent primary patency and similarly low rates of branch-related complications and endoleaks, with no branch-related aortic rupture or death. Our results demonstrate that in a high-volume, experienced aortic center, the VBX stent is a safe and effective bridging stent option during branched endovascular aortic repair. Multicenter studies with a larger cohort and longer follow-up are necessary to validate these findings. (J Vasc Surg 2021;73:410-6.)

# Meta-analysis of Comparative Studies Between Self- and Balloon-Expandable Bridging Stent Grafts in Branched Endovascular Aneurysm Repair

Petroula Nana<sup>1 2</sup>, Konstantinos Spanos<sup>1 2</sup>, Alexandros Brodis<sup>3</sup>, Giuseppe Panuccio<sup>2</sup>, George Kouvelos<sup>1</sup>, Christian-Alexander Behrendt<sup>2</sup>, Athanasios Giannoukas<sup>1</sup>, Tilo Kölbel<sup>2</sup>

5 included of 609 articles  
2016-2020  
1406 TV – 547 BEGS & 859 SEGS

## Freedom from TV instability



No difference in terms of patency or endoleak

TVs being revascularized using SESG stents presented lower risk for instability in comparison with BESG



# Effect of bridging stent graft selection for directional branches on target artery outcomes of fenestrated-branched endovascular aortic repair in the United States Aortic Research Consortium

Emanuel R. Tenorio, MD, PhD,<sup>a</sup> Andres Schanzer, MD,<sup>b</sup> Carlos H. Timaran, MD,<sup>c</sup> Darren B. Schneider, MD,<sup>d</sup> Bernardo C. Mendes, MD,<sup>e</sup> Matthew J. Eagleton, MD,<sup>f</sup> Mark A. Farber, MD,<sup>g</sup> F. Ezequiel Parodi, MD,<sup>g</sup> Warren J. Gasper, MD,<sup>h</sup> Adam W. Beck, MD,<sup>i</sup> Matthew P. Sweet, MD,<sup>j</sup> Sara L. Zettervall, MD,<sup>j</sup> Ying Huang, MD, PhD,<sup>a</sup> and Gustavo S. Oderich, MD,<sup>a</sup> on behalf of the U.S. Fenestrated

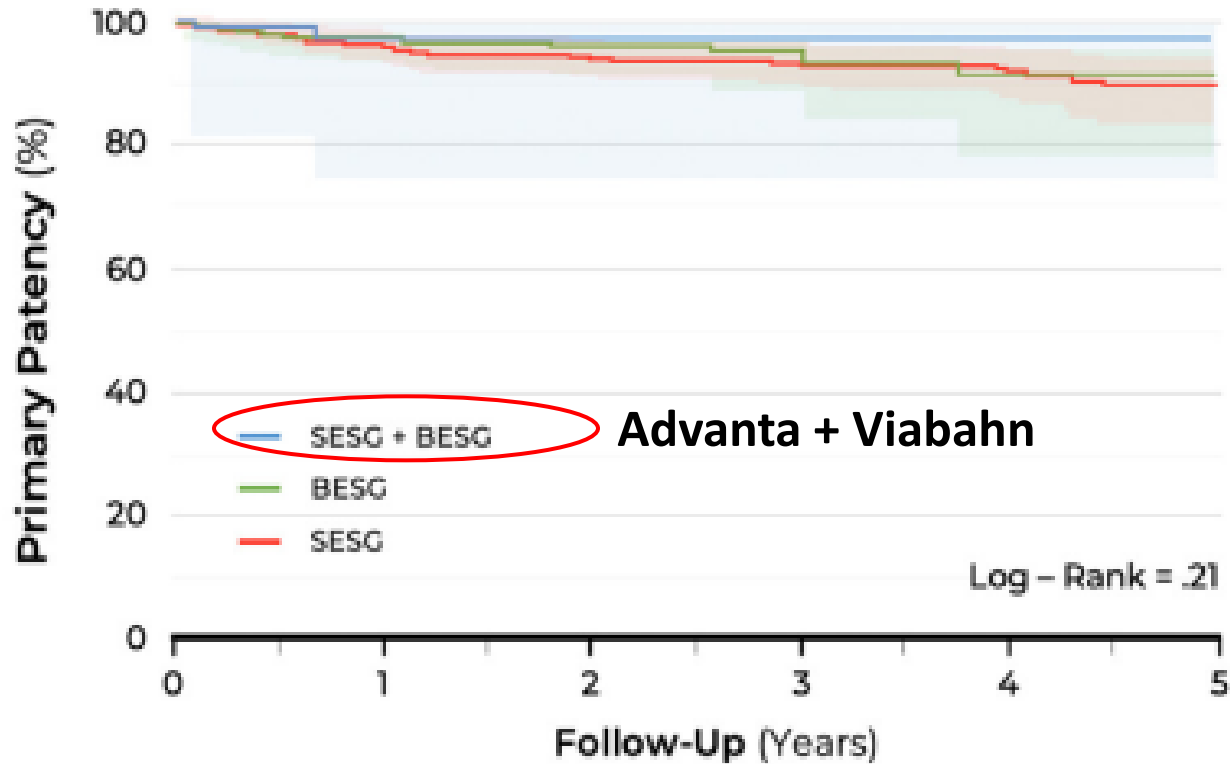
Multicenter prospective observational cohort study  
2005-2020  
800 patients - 2426 TV  
Median follow-up was 15 months

- **Balloon-expandable (BESGs)**
- **Self-expanding (SESGs)**
- **Hybrid (BESGs & SESGs)**

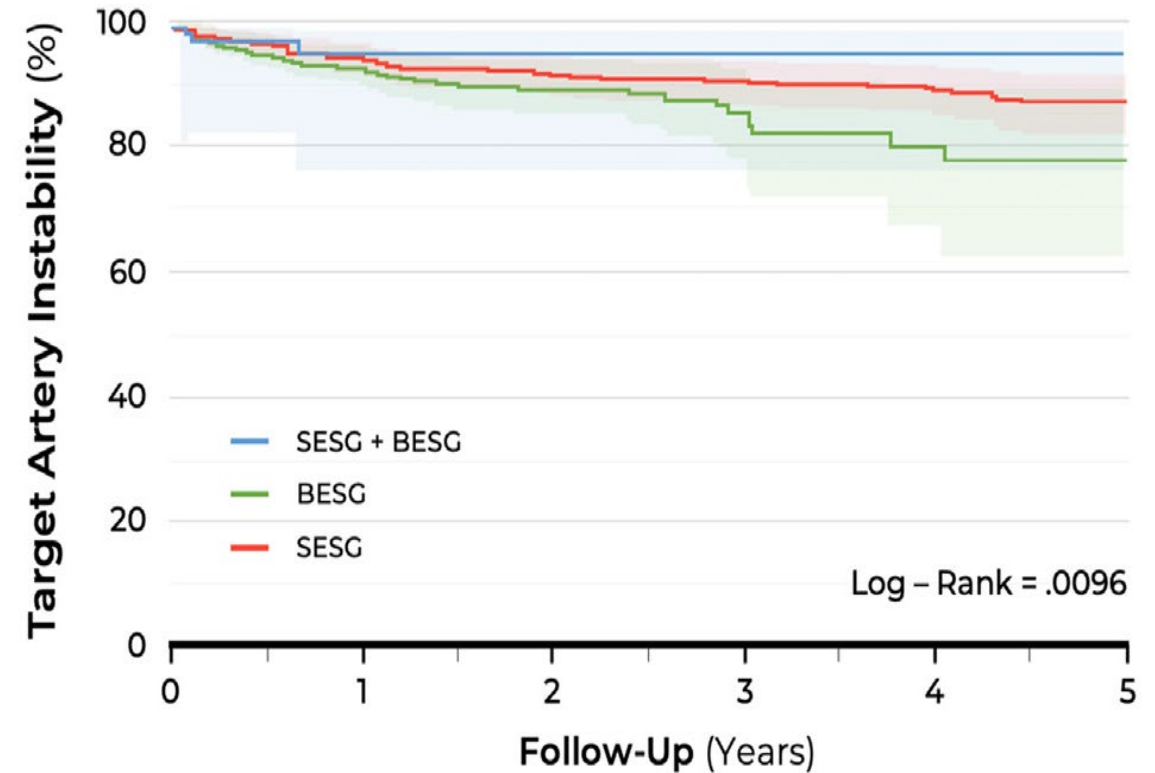
## - **BESGs**

- Same patency with SESGs
- ↑ Instability, endoleak, and reinterventions vs SESGs and Hybrid configurations

## TV PATENCY



## FREEDOM FROM INSTABILITY

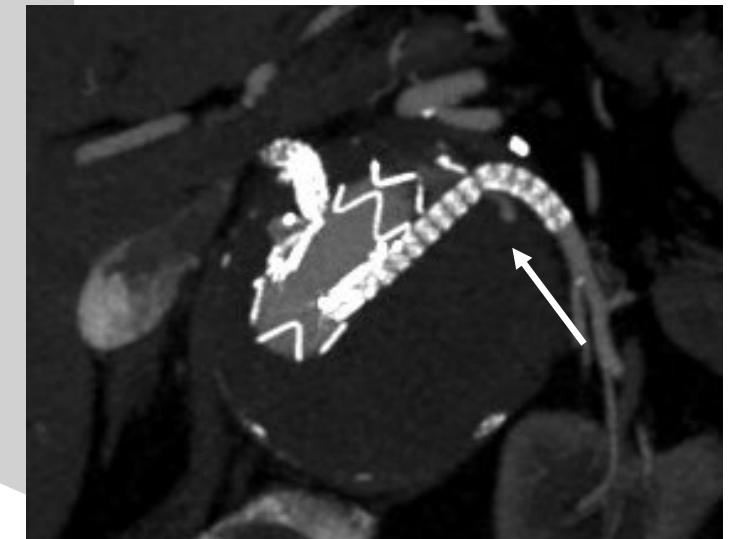
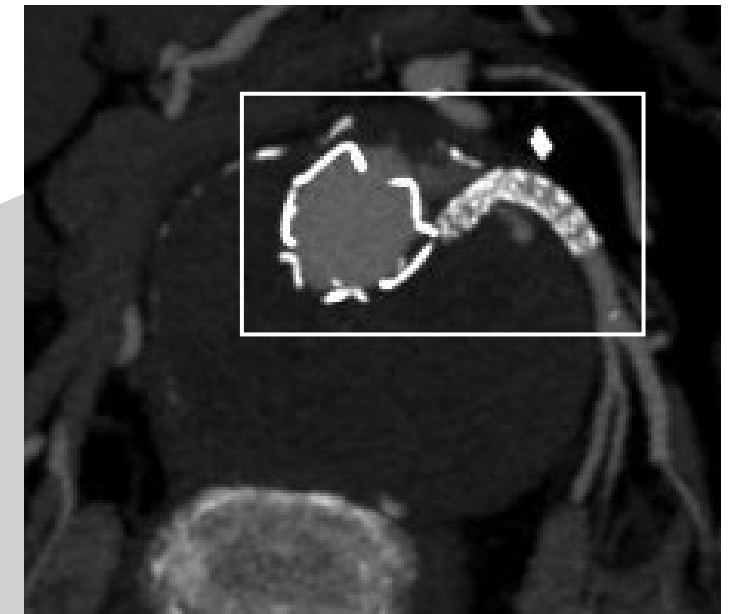


→ Hybrid (SESG + BESG): better patency and ↑ Freedom from instability

struction. Until specific, purpose-built FB-EVAR bridging stent grafts are commercialized, HSG may offer the best performance among the different stent configurations currently available.

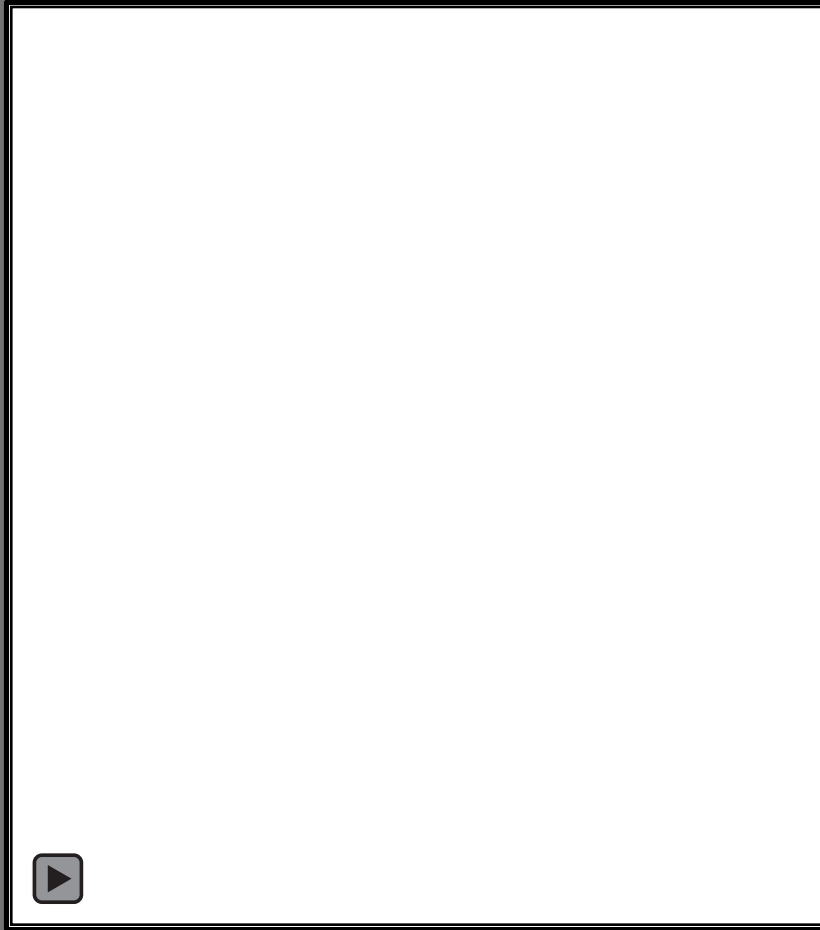
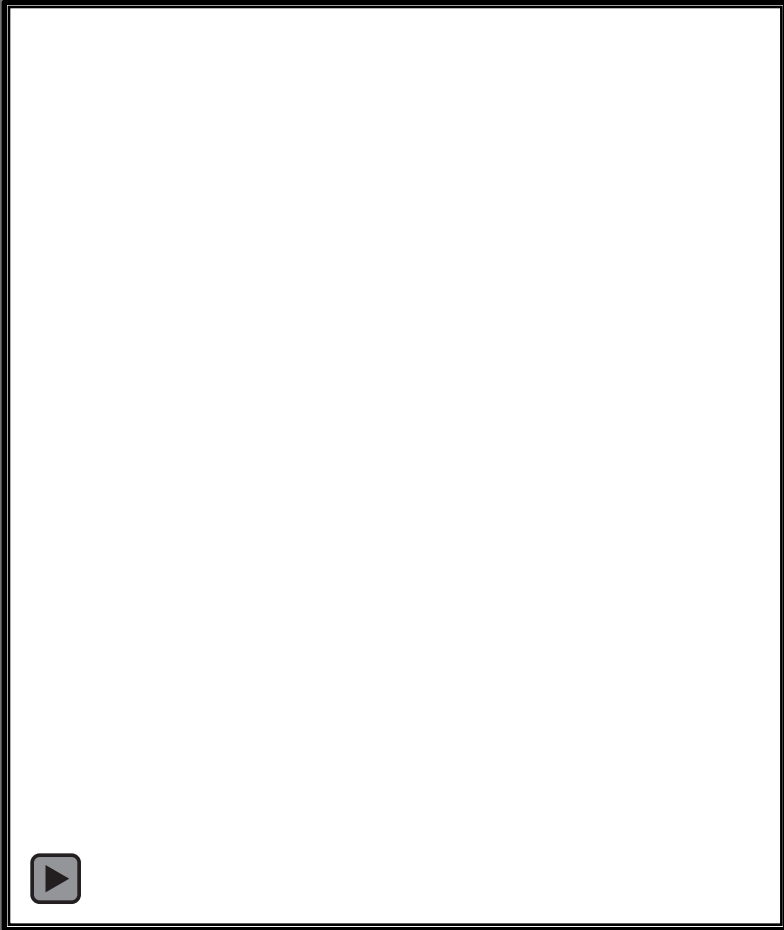
# CLINICAL CASES

ANEURYSMAL SAC 9.5 CM



EL IN PREVIOUS JOTEC E-NSIDE FOR TAAA

VBX 10X59 SMA  
VBX 6X59 + BeGraft 8X57 right RA  
**VBX 6X79 left RA**



Confirmation of endoleak type Ic (left renal artery)

Relining with Viabahn BXA065302E

# In conclusion:

- Currently, there is no “ideal” bridging stent
- Optimal patency and reasonable TVI especially for fenestrated & Mesenteric/celiac
- There are no RCTs available
- The choice of the material is dependent on **physicians’ experience & patient anatomical features**