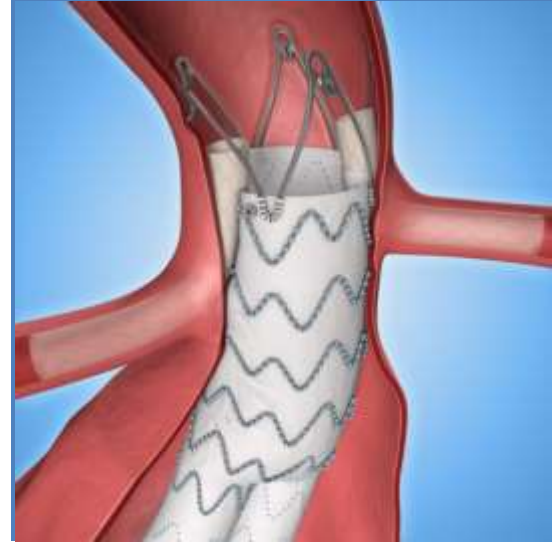


My secrets in CHEVAR sizing and planning

Jean-Paul PM De Vries
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SITE Congress

Barcelona, March 2019



Disclosures

Speaker name: J.P.P.M. de Vries

I have the following potential conflicts of interest to report:

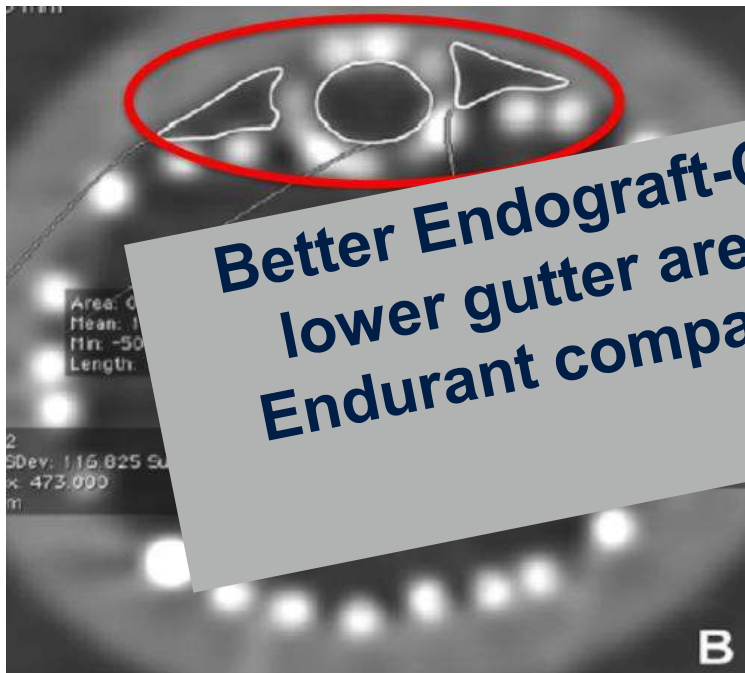
- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

I do not have any potential conflict of interest

BENCHTEST PERFORMANCES

The Best Conditions for Parallel Stenting During EVAR: An *In Vitro* Study

G. Mestres^{a,*}, J.P. Uribe^a, C. García-Madrid^a, E. Miret^b, X. Alomar^c, M. Burrell^d, V. Riambau^a



Better Endograft-Chimney apposition and lower gutter area with an oversizing of Endurant compared to aortic diameter of 30%

	Oversizing			P
			excessive	
			6-4.6)	<0.001
			-4.6)	0.002
			-4.7)	0.010
			4.4)	0.005
			.7)	0.002
)	0.684
	25%)	17% (8-24%)	13% (3-18%)	0.715
	11% (6-40%)	22.7% (8.0-32%)	17% (10-36%)	0.918
Parallel stent				
Viabahn	27% (12-40%)	23% (15-31%)	23% (12-36%)	0.796
V12	3% (0-10%)	17% (0-23%)	13% (0-15%)	0.225
Infolding of the main endograft (% and number)	0% (0/12)	8% (1/12)	58% (7/12)	0.001
Excluder	0% (0/6)	17% (1/6)	100% (6/6)	0.001
Endurant	0% (0/6)	0% (0/6)	17% (1/6)	0.368

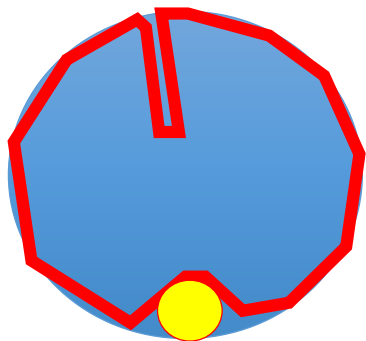
GUTTER ENDOLEAKS

INAPPROPRIATE SIZING

INSUFFICIENT SEALING

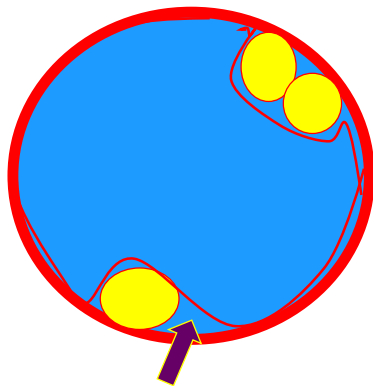
Pattern A

Excessive oversizing of the aortic endograft



Pattern B

Undersizing of the aortic endograft in large necks



Pattern C

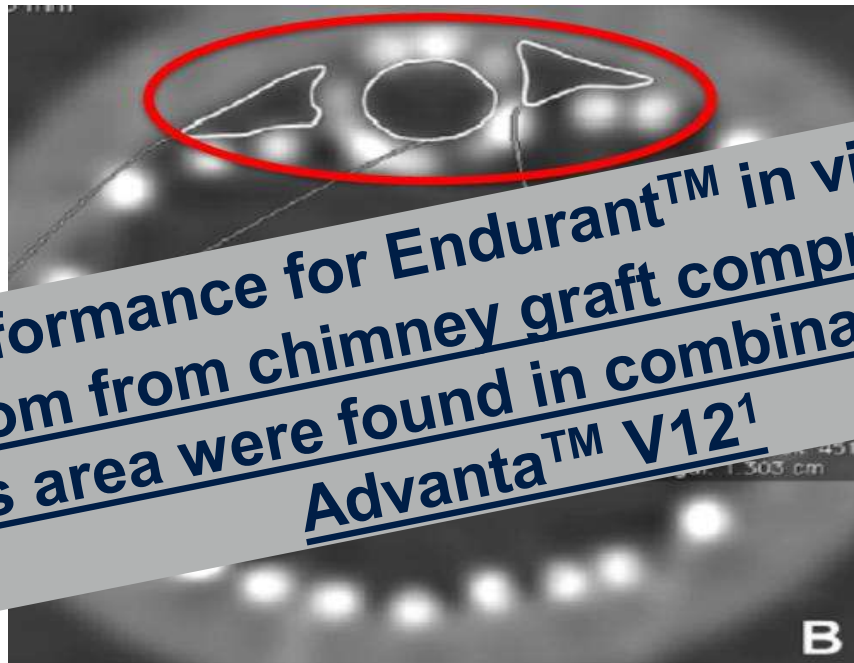
Insufficient sealing length and migration



BENCHTEST PERFORMANCES

The Best Conditions for Parallel Stenting During EVAR: An *In Vitro* Study

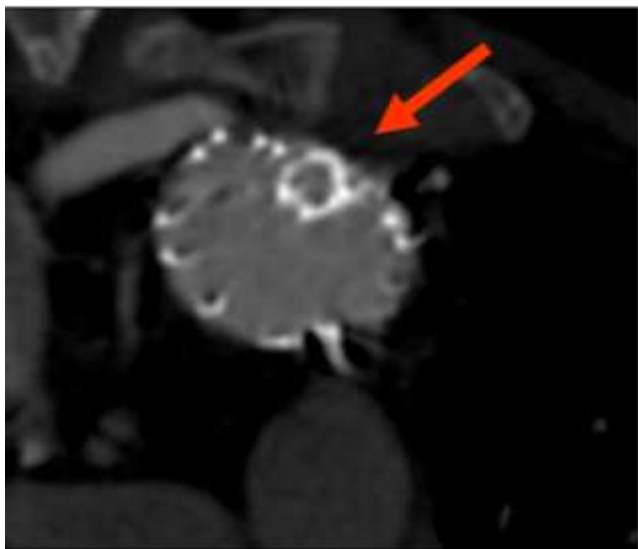
G. Mestres^{a,*}, J.P. Uribe^a, C. García-Madrid^a, E. Miret^b, X. Alomar^c, M. Burrell^d, V. Riambau^a



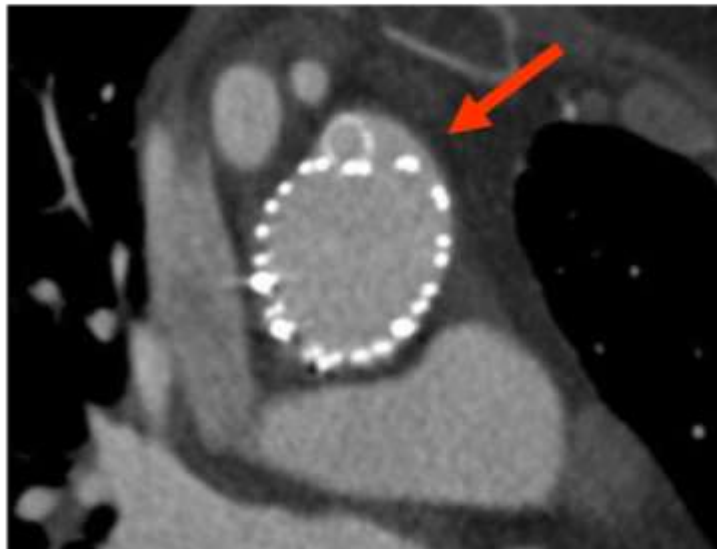
**Best performance for Endurant™ in vitro regarding
Freedom from chimney graft compression and
gutters area were found in combination with the
Advanta™ V12¹**

ROAD TOWARDS STANDARDIZATION - PERICLES

Nitinol Endoskeleton

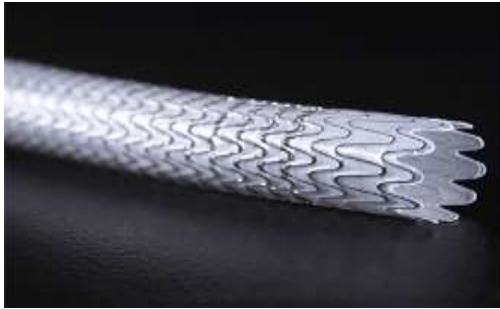


Stainless Steel Endoskeleton



ROAD TOWARDS STANDARDIZATION - PERICLES

Self Expanding Covered Stents



Balloon Expandable Covered Stents

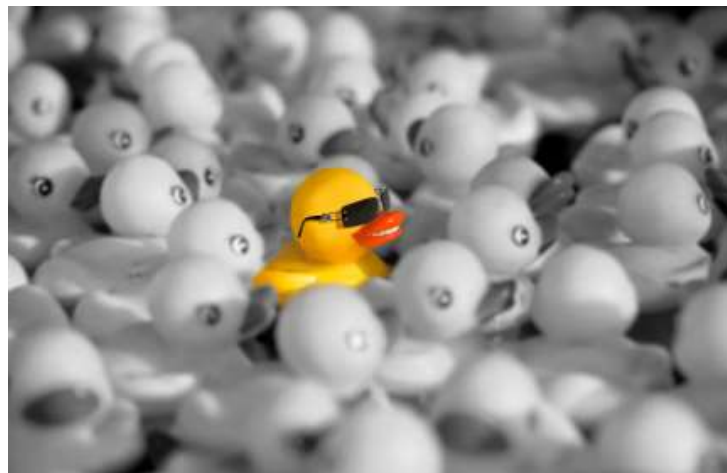


Interestingly, there seemed to be a trend toward the use of a balloon-expandable covered stent having 2-fold reduction in type Ia endoleaks than self-expanding covered stents ($P = 0.018$).

A STANDARDIZED APPROACH - PROTAGORAS

The PROTAGORAS study to evaluate the performance of the Endurant stent graft for patients with pararenal pathologic processes treated by the chimney/snorkel endovascular technique 2016

Konstantinos P. Donas, MD,^{1,2} Giovanni B. Torsello, MD,^{1,3} Gianluca Piccoli, MD,⁴
Georgios A. Pitoullas, MD,^{2,3,4} Giovanni Federico Torsello, MD,⁴ Theodosios Bisdas, MD,^{1,2}
Martin Austermann, MD,^{1,3} and Daniele Gasparini, MD,⁵ *Münster, Germany; Udine, Italy; and Thessaloniki, Greece*



128 patients from **3** international centers

- Standard use of Endurant abdominal device
- Standard use of BECS as chimney grafts when possible
- Standardized CT/MR Kaplan-Meier 3-year FU

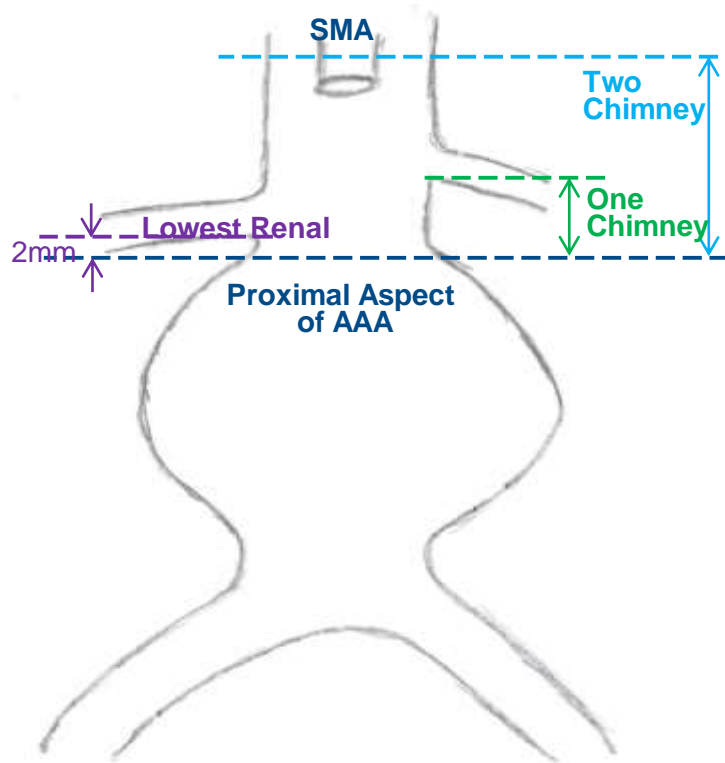
A STANDARDIZED APPROACH - PROTAGORAS

Preoperative maximal AAA diameter	64.8 mm
Preoperative proximal neck diameter	24 mm
Preoperative proximal neck length	4.7 mm
Preoperative suprarenal neck angulation	22.8°

- The mean aneurysm sac decreased significantly (from 64.8 to 60.8 mm, $p=.001$)
- New sealing zone from $<5\text{mm}$ to **18.7mm**
- New onset of **type IA EL** with increase of AAA requiring reintervention in **1.6%** after a mean radiological follow up of 3-year KM curves

HOW TO OPTIMIZE SEAL - SIZING

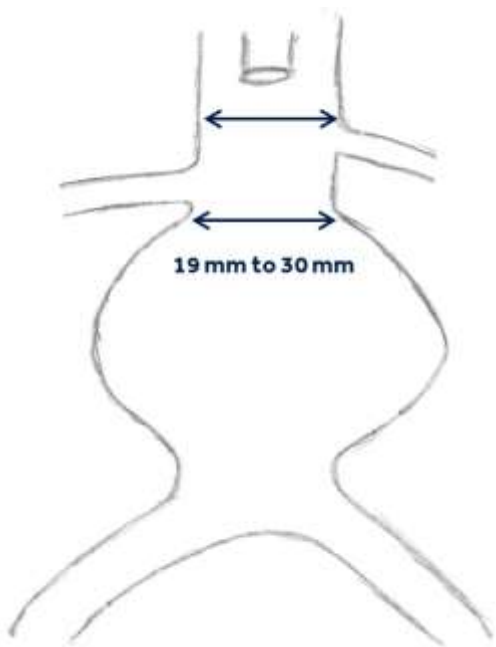
JUXTARENAL AAA - SEAL



- **ONLY** Primary indication, not revision cases
- **MINIMUM** sealing zone
 - For one Chimney: **15 mm** from proximal aspect of AAA to highest renal
 - For two Chimney: **15 mm** from proximal aspect of AAA to SMA
- This must include a **MINIMUM** infrarenal neck of **2 mm** (range 2 mm to 9 mm)

HOW TO AVOID EL - SIZING

JUXTARENAL AAA - DIAMETER



- Aortic diameter treatment range
 - **19 mm to 30 mm**
- Oversizing recommendations
 - **20 to 30%**
- BE covered stents
 - **Any brand**

Graft diameter (proximal; mm)	Vessel inner diameter (mm)	
	Standard configuration	Parallel configuration
23	19 -20	N/A
25	21-22	19-20
28	23-25	21-23
32	26-28	24-26
36	29-32	27-30

RECOMMENDED MAXIMUM ANGULATIONS



- Maximum supra SMA* angle

45

- Maximum suprarenal angle

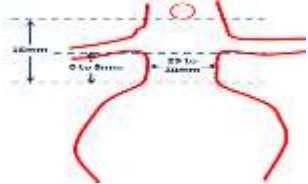

45

- Maximum infrarenal angle

60

HOW TO AVOID EL – PATIENT SELECTION

JUXTARENAL AAA, 2MM MIN NECK

Short neck	Angulated neck
<ul style="list-style-type: none">• New neck length 15 mm• Infrarenal neck length ≥ 2 mm up to 9 mm• New neck diameter from 19 to 30 mm• Possibly 1 or 2 Chimneys	<ul style="list-style-type: none">• Supra SMA angulation of 0° - 45°• Suprarenal neck angulation 0° - 45°• Infrarenal neck angulation 0° - 60°
	
<p>Insignificant calcification and thrombus at the level of proximal neck, adequate axillary or brachial artery access, Limited Thrombus or calcification in the arch and DTA</p>	

1. ACCESS RENAL WITH RENAL GUIDE WIRE

1.1.



Target renal with long diagnostic catheter (110 to 125 cm)

1.2.



Access renal with guide wire

1.3.



Advance catheter over guide wire

1.4.



Access renal with renal guide wire and remove diagnostic catheter

2. BECS RENAL STENT INTRODUCTION

2.1.



Target renal with long 7Fr sheath
(110 to 125 cm)

2.2.



Dilator removal

2.3.



Renal Stent introduction (e.g. Advanta™ V12¹)

2.4.

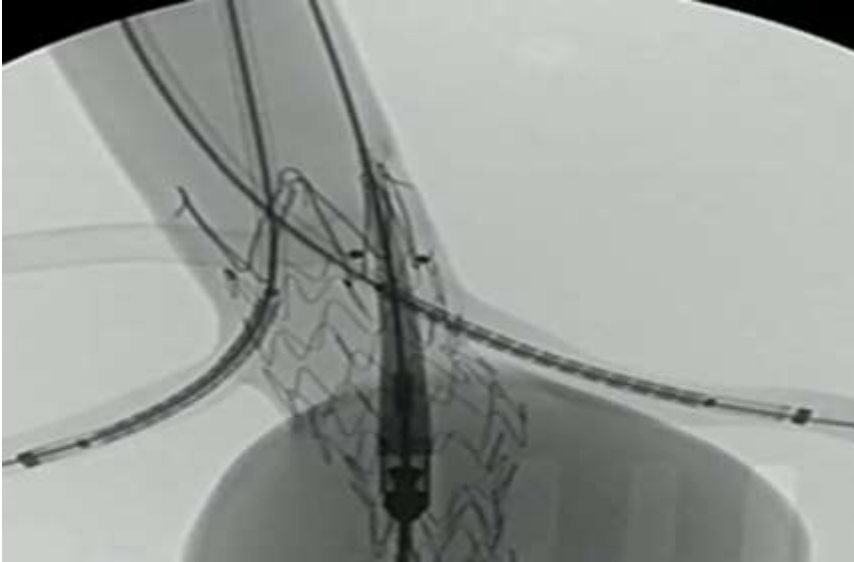


Repeat on additional Renal artery if multiple
Chimney required

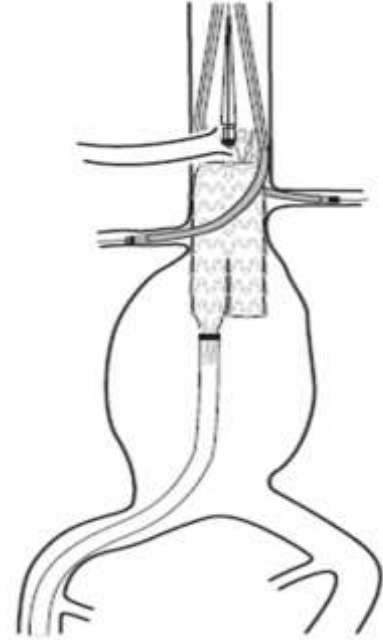
3. INTRODUCTION OF ENDOGRAFT DELIVERY SYSTEM



4. DEPLOYMENT OF MAIN BODY

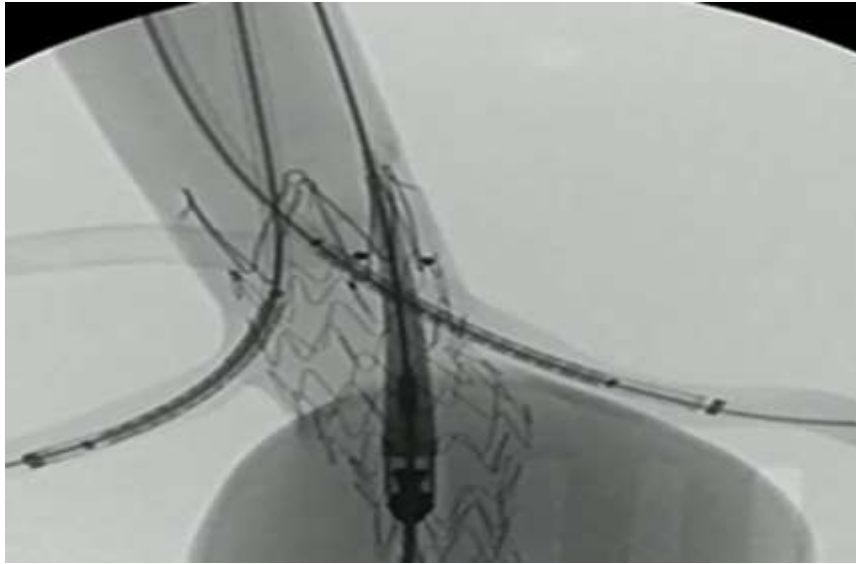


Deployed Endurant™ stentgraft

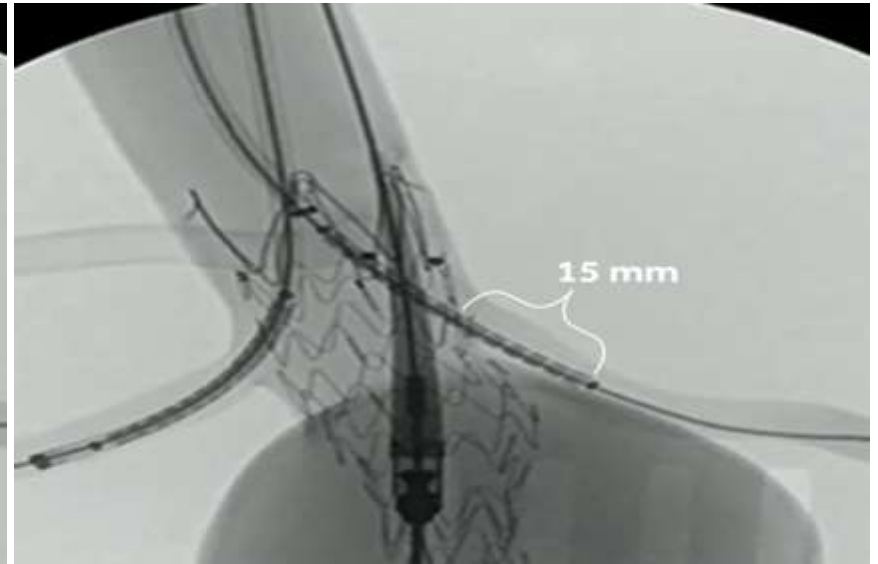


5. POSITIONING OF RENAL STENTS

5.1.



5.2.



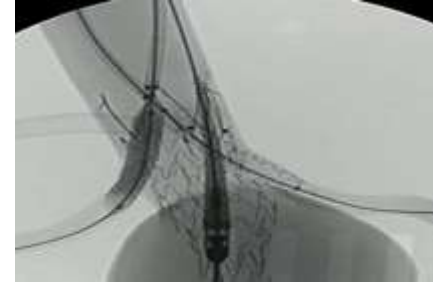
6. BECS RENAL STENT DEPLOYMENT

6.1.



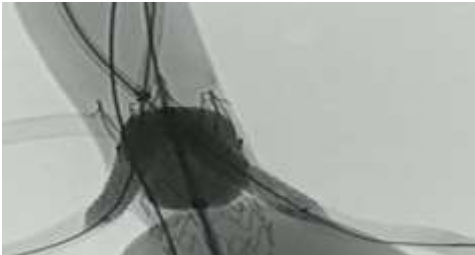
Renal stent is ballooned according to the manufacturers IFU

6.2.



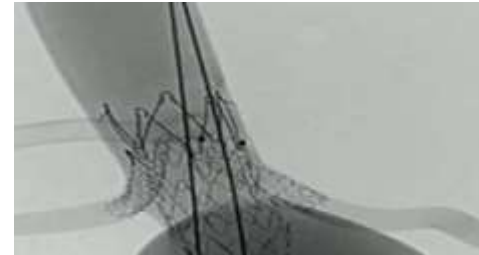
Process is repeated if multiple Chimneys are present

6.3.



Kissing balloon inflated, reliant and renal stents to promote moulding

6.4.

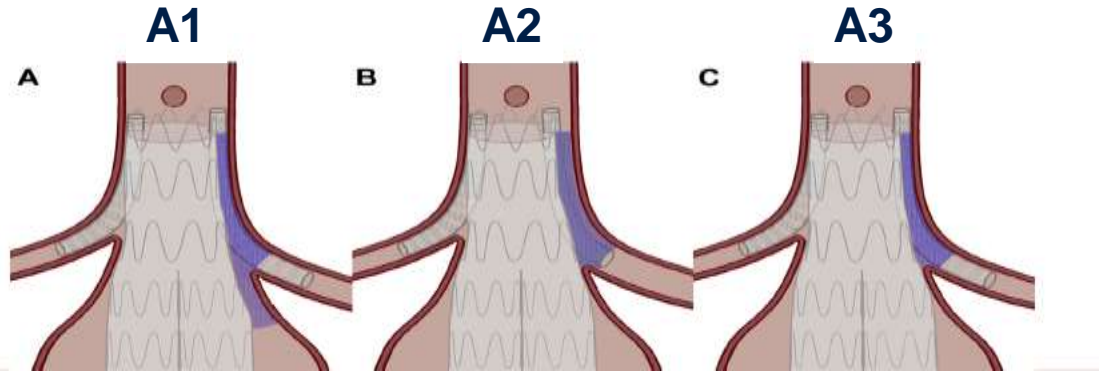


DO NOT remove guide wires from renal stents until completion of final satisfactory angiogram

GUTTER CLASSIFICATION: TYPE A

Classification of gutter type in parallel stenting during endovascular aortic aneurysm repair

Simon P. Overeem, MSc,^{1,2} Johannes T. Boersen, MSc,^{1,2,3} Richte C. L. Schuurmann, MSc,^{1,2} Erik Groot Jebbink, MSc,^{1,2} Cornelis H. Slump, PhD,¹ Michel M. P. J. Reijnen, MD, PhD,¹ and Jean-Paul P. M. de Vries, MD, PhD,¹ Enschede, Nieuwegein, and Arnhem, The Netherlands



Type A1: Gutter originating at the proximal start of the fabric of the endograft and continuing into the aneurysm sac.

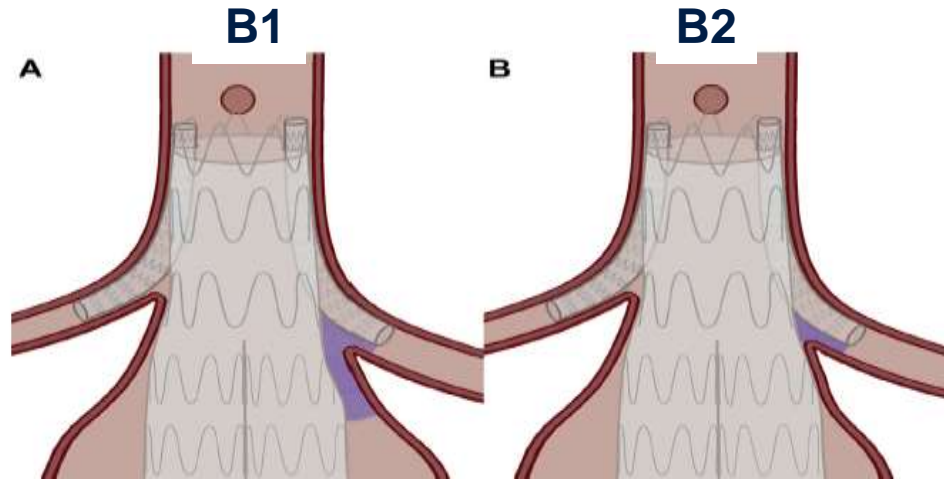
Type A2: Gutter originating at the proximal start of the fabric of the endograft and extending into the side branch vessel.

Type A3: gutter that begins at the proximal start of the endograft fabric and terminates proximal to the aneurysm sac or chimney stent graft

GUTTER CLASSIFICATION: TYPE B

Classification of gutter type in parallel stenting during endovascular aortic aneurysm repair

Simon P. Overeem, MSc,^{1,2} Johannes T. Boersen, MSc,^{1,2,3} Richte C. L. Schuurmann, MSc,^{1,2} Erik Groot Jebbink, MSc,^{1,2} Cornelis H. Slump, PhD,¹ Michel M. P. J. Reijnen, MD, PhD,¹ and Jean-Paul P. M. de Vries, MD, PhD,¹ Enschede, Nieuwegein, and Arnhem, The Netherlands



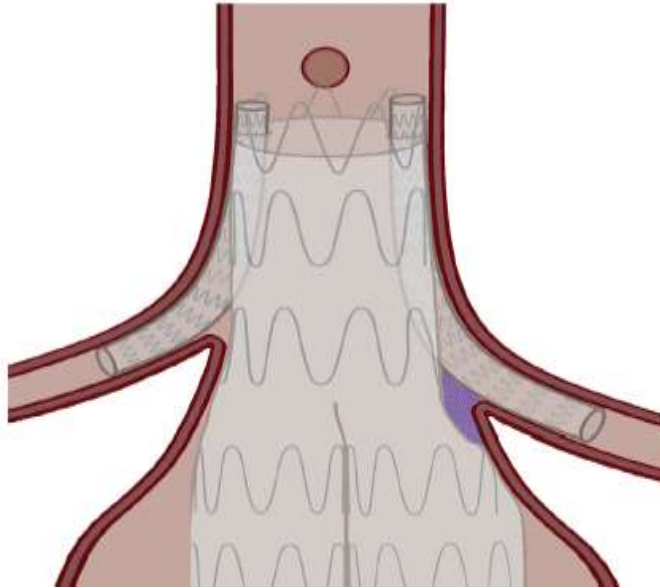
Type B1: The gutter connects the visceral artery with the aneurysm sac, potentially leading to a type IB endoleak

Type B2: There is no connection with the aneurysm sac.

GUTTER CLASSIFICATION: TYPE C

Classification of gutter type in parallel stenting during endovascular aortic aneurysm repair

Simon P. Overeem, MSc,^{1,2} Johannes T. Boersen, MSc,^{1,2,3} Richte C. L. Schuurmann, MSc,^{1,2} Erik Groot Jebbink, MSc,^{1,2} Cornelis H. Slump, PhD,^{1,2} Michel M. P. J. Reijnen, MD, PhD,^{1,2} and Jean-Paul P. M. de Vries, MD, PhD,^{1,2} Enschede, Nieuwegein, and Arnhem, The Netherlands



Type C: A gutter originating below the fabric of the endograft, without any connection to the proximal and distal chimney end or continuation into the aneurysm sac. Type C gutter describes an enclosed volume; typically, type C gutter is not related to endoleak

CONCLUSIONS:

- Standardization of device combinations, creation of a new proximal neck length of >15 mm, and proper sizing and planning are essential for CHEVAR success.
- Keys to success
 - Seal zone 15 mm
 - Maximum 2 chimneys
 - Oversizing endograft 30%
 - BECS