What are the <u>latest findings</u> after the PERICLES Registry about CHEVAR

Konstantinos Donas Münster, Germany

PERICLES Registry

PAPERS OF THE 135TH ASA ANNUAL MEETING

Collected World Experience About the Performance of the Snorkel/Chimney Endovascular Technique in the Treatment of Complex Aortic Pathologies

The PERICLES Registry

Konstantinos P. Donas, MD,* Jason T. Lee, MD,† Mario Lachat, MD,‡ Giovanni Torsello, MD, PhD,§ and Frank J. Veith, MD;¶ on behalf of the PERICLES investigators

Objectives: We sought to analyze the collected worldwide experience with use of snorkel/chimney endovascular aneurysm repair (EVAR) for complex abdominal aneurysm treatment.

Background: EVAR has largely replaced open surgery worldwide for anatomically suitable aortic aneurysms. Lack of availability of fenestrated and branched devices has encouraged an alternative strategy utilizing parallel or snorkel/chimney grafts (ch-EVAR).

Methods: Clinical and radiographic information was retrospectively reviewed and analyzed on 517 patients treated by ch-EVAR from 2008 from 2014 by prearranged defined and documented protocols.

Results: A total of 119 patients in US centers and 398 in European centers were treated during the study period. US centers preferentially used Zenith stent-grafts (54.2%) and European centers Endurant stent-grafts (62.2%) for the main body component. Overall 898 chimney grafts (49.2% balloon expandable, 39.6% self-expanding covered stents, and 11.2% balloon expandable bare metal stents) were placed in 692 renal arteries, 156 superior mesenteric arteries (SMA), and 50 celiac arteries. At a mean follow-up of 17.1 months

(range: 1–70 months), primary patency was 94%, with secondary patency of 95.3%. Overall survival of patients in this high-risk cohort for open repair at latest follow-up was 79%.

Conclusions: This global experience represents the largest series in the ch-EVAR literature and demonstrates comparable outcomes to those in published reports of branched/fenestrated devices, suggesting the appropriateness of broader applicability and the need for continued careful surveillance. These results support ch-EVAR as a valid off-the-shelf and immediately available alternative in the treatment of complex abdominal EVAR and provide impetus for the standardization of these techniques in the future.

Keywords: abdominal aortic aneurysm, endovascular, fenestrated, thoracoabdominal, vascular

(Ann Surg 2015;262:546-553)

The snorkel/chimney technique is an endovascular therapeutic modality for branch revascularization in complex aortic pathologies that has gained increasing popularity since the first publications in 2003 and 2007.^{1,2} These techniques have emerged from the basic

Collected World Experience About the Performance of the Snorkel/Chimney Endovascular Technique in the Treatment of Complex Aortic Pathologies The PERICLES Registry

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What is new?

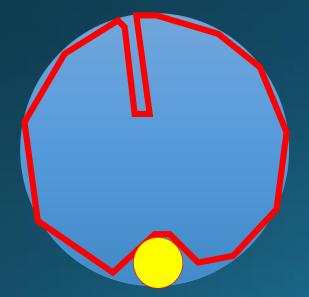
Classification of Chimney EVAR–Related Endoleaks: Insights From the PERICLES Registry

Journal of Endovascular Therapy 2017, Vol. 24(1) 72–74 © The Author(s) 2016 Reprints and permissions: sagepub.com/journalsPermissions.nav DOI: 10.1177/1526602816678994 www.jevt.org

Konstantinos P. Donas, MD^{1,2}, Frank J. Criado, MD³, Giovanni Torsello, MD^{1,2}, Frank J. Veith, MD^{4,5}, and David J. Minion, MD,⁶ on behalf of the PERICLES Registry Collaborators

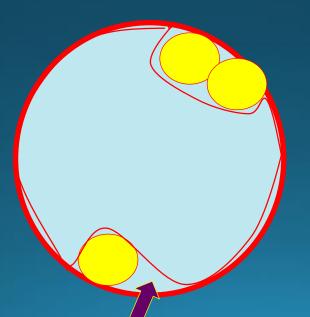
Pattern A

Excessive oversizing of the aortic endograft



Pattern B

Undersized aortic endograft in large neck diameters or multiple chimneys



Pattern C

Insufficient sealing length and migration



Collected World Experience About the Performance of the Snorkel/Ch:

Classification of Chimney EVAR-Related Endoleaks: Insights From the PERICLES

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What is new?

Incidence and prognostic factors related to major adverse cerebrovascular events in patients with complex aortic diseases treated by the chimney technique

Michael J. Bosiers, MD, a,b, Kenneth Tran, MD, a,b Jason T. Leq, MD, Konstantinos P. Donas, MD, a,b Frank J. Veith, MD, Giovanni Torsello, MD, Felice Pecoraro, MD, and Konstantinos Stavroulakis, MD, a,b for the PERICLES-Registry Collaborators, Münster, Germany; Stanford, Calif, New York, NY; Zurich, Switzerland

ABSTRACT

Objective: Endovascular aneurysm repair (EVAR) with the chimney technique (ch-EVAR) has been used for the treatment of aortic aneurysms as an alternative approach to fenestrated endografting or open repair. Nonetheless, the need for an upper extremity arterial access may contribute to a higher risk for periprocedural cerebrovascular events. This study reports on the perioperative cerebral and major adverse cardiac and cerebrovascular events (MACCE) after ch-EVAR.

Methods: The PERICLES registry (PERformance of the chlmney technique for the treatment of Complex aortic pathoLogiES) is an international, retrospective multicenter study evaluating the performance of ch-EVAR for the treatment of complex aortic pathologies. For the purpose of the current analysis, 425 patients treated by ch-EVAR between 2008 and 2014 were included. The primary outcome of this analysis was the incidence of procedure related cerebrovascular events defined as transient ischemic attack or stroke. The secondary endpoint was in-hospital MACCE, including acute coronary syndrome, stroke, and death of any cause.

Results: The incidence of clinical relevant cerebrovascular cents was 1.9% (8/425). A ostoperative transient ischemic attack was observed in 4 patients (0.95%) and a stroke in additional 4 (0.95%). Three patients died during the hospital stay secondary to sequelae from postoperative stroke. A prior history of stroke/transient ischemic attack, atrial fibrillation, previous carotid revascularization, or known carotid artery disease did not significantly increase the risk for adverse neurologic events. The overall MACCE rate amounted to 8.5% (36/425). Logistic regression analysis revealed that the use of bilateral upper extremity access (odds ratio [OR], 2.79; 95% confidence interval [CI], 1.04-7.45]), aneurysm rupture (OR, 5.33; 95% CI, 1.74-16.33), and a prolonged operation time (>290 minutes; OR, 1.005; 95% CI, 1.001-1.008) were associated with a significantly increased risk for MACCE.

Conclusions: This analysis demonstrates that ch-EVAR is associated with a relatively low rate of cerebrovascular events. However, a postoperative stroke is associated with increased mortality. Ruptured aneurysms, bilateral upper extremity access as in case of multiple chimney graft placement, and longer operative times were identified as independent risk factors for MACCE. (J Vasc Surg 2017; 1-8.)

Table V. Anatomic and procedural factors (MACCE)

	Cohort (n = 425)	MACCE (n = 36)	No MACCE (n = 389)	P
Rupture			18 (4.6)	<.001
Suprarenal	Marie Marie Control of the Control o			.056
Old EVAR				.756
Old open				.250
Multichimney				.188
Access				
Bilateral				.013
Left only				.228
Right only				.643
Sheath size				
6-F				.375
7-F			The state of the s	.248
8-F		The Asia		.426
OR time (mir				.045
Arch type (in				
1		THE WAY TO		.517
2				.358
3				.899
EVAR, Endovascular aneurysm re Data are n (%) or mean ± standa			g room.	

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This analysis demonstrates that ch-EVAR is associated with increased mortality. Ruptured aneurysms, bilateral upper extremity.

Conclusions:

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What is also new?

Therapy

Identification of optimal device combinations for the chimney endovascular aneurysm repair technique within the PERICLES registry

Salvatore T. Scali, MD,^a Adam W. Beck, MD,^b Giovanni Torsello, MD,^c Mario Lachat, MD,^d Paul Kubilis, MS,^a Frank J. Veith, MD,^e Jason T. Lee, MD,^f and Konstantinos P. Donas, MD,^c on behalf of the PERICLES investigators, Cainesville, Fla; Birmingham, Ala; Münster, Germany; Zurich, Switzerland; New York, NY; and Palo Alto, Calif

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Objective: The ideal stent combination for chimney endovascular aneurysm repair remains undetermined. Therefore, we sought to identify optimal aortic and chimney stent combinations that are associated with the best outcomes by analyzing the worldwide collected experience in the PERformance of chimney technique for the treatment of Complex autiewed for patients with pararenal aortic disease electively treated from 2008 to shree distinct subgroups: group A (n = 224), nitinol/polyester, LA LOGIES (PERICLES) registry.

Conclusions: Within the PERICLES registry, use of nitinol/polyester stent graft devices with BECS during chimney endovascular aneurysm repair is associated with improved survival compared with other aortic endografts. However, this advantage was not observed for non-BECS repairs. Repairs incorporating multiple chimney subtypes were also associated with increased mortality risk. Importantly, increasing chimney stent number and bare-metal endolining stents increase chimney occlusion risk, whereas patients treated at low-volume centers have higher risk of type la endoleak. (J Vasc Surg 2018; ■:1-12.)

endoleak (intraoperatively and postoperatively) did not significantly differ for the aoruz lower of the aor group C patients had higher risk relative to groups A/B without BECS (C vs B. odds ratio [OR], 32 [9576] to groups A/B without BECS (C vs B. odds ratio [OR] A/B: OR. 24 [95% Cl. 0.9-64; P = .08]]. Patients treated at high-volume centers had significantly lower odds to make the combination.

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Opment of type Ia endoleak (OR. 0.2: 95% CI, 0.1-0.7: P = .0.11) irrespective of aortic or chimney device combination.

BECS vs group A + BECS (HR. 5.3: 95% CI. 16-17.5: P = .0.01) irrespective of aortic or chimney device combination.

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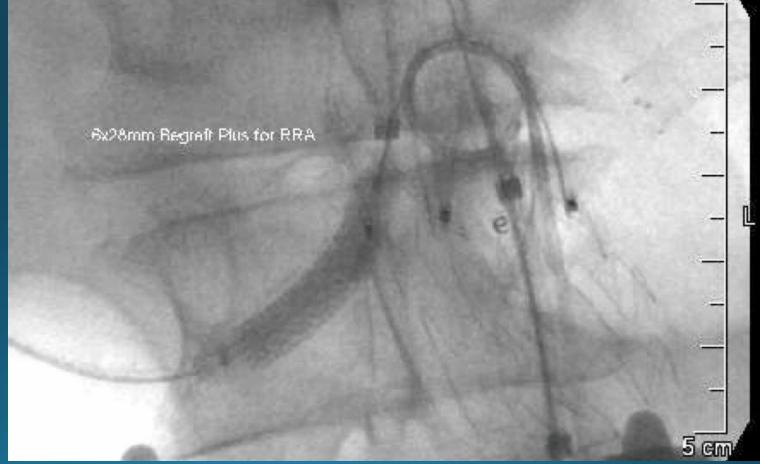
Opment of type Ia endoleak (OR. 0.2: 95% CI, 0.1-0.7: P = .0.11) irrespective or chimney device combination. Mortality risk was significantly higher in group C+ BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and a syear survival for groups A, B, and C (+BECS) was as follows: group A and BECS (+BECS) was as follows: group 3-year survival for groups A B, and C (+BEC\$) was as follows: group A 9796 \pm 196 and 92% \pm 396 group B, 9396 \pm 196 and 92% \pm 396 group A subtype was associated with than one chimney subtype was associated with 3-year survival for groups C, 8496 \pm 796 and 6396 \pm 1496. Use of more than one chimney subtype was associated with 3-year survival for groups C, 8496 \pm 796 and 6396 \pm 1006). increased mortality (HR. 3.2: 95% CL. 1.4-75. P = 006).

Conclusions: Within the PERICLES registry.

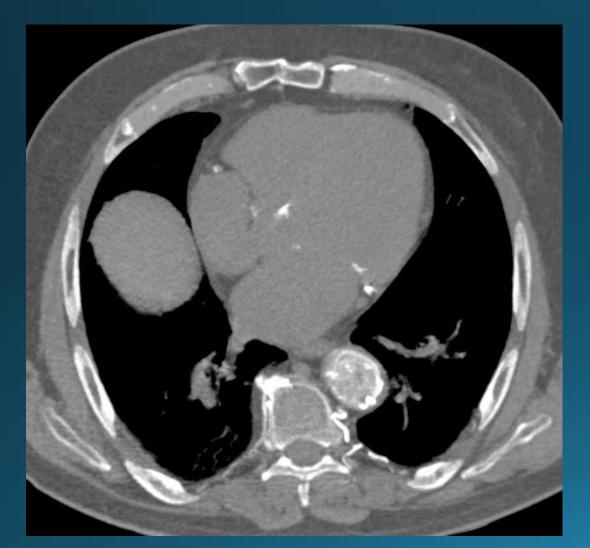
NEED FOR EVALUATION OF CHIMNEY GRAFTS IN-VITRO EVALUATION OF CHIMNEY GRAFTS



Symptomatic para-anastomotic aneurysm of 6.9 cm diameter



Chevar case



The preoperative CTA was used for the creation of an anatomically 1:1 similar silicon model



Connection of the silicon model with a pulsatile pump unit simulating blood flow

Fluid simulation system



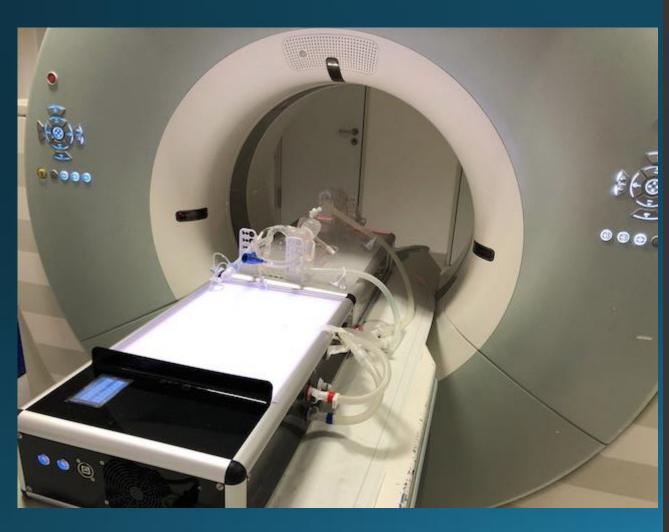


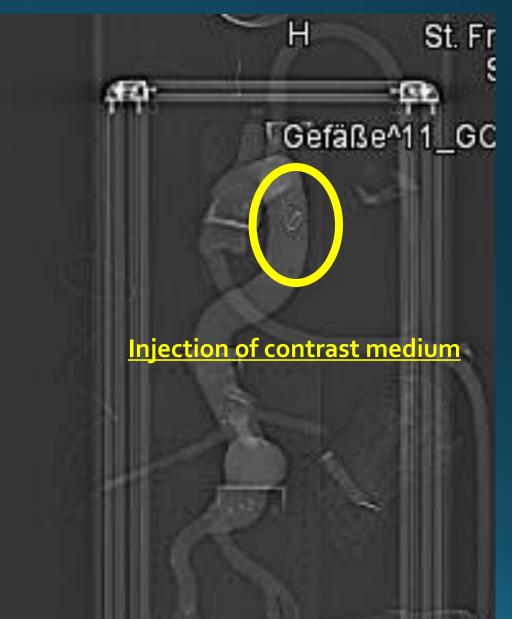
Fluid simulation system

Characteristics

 The device can be exposed to computed tomography and offers the option for injection of contrast medium performing additional an angiography (CTA)

CT Angiography

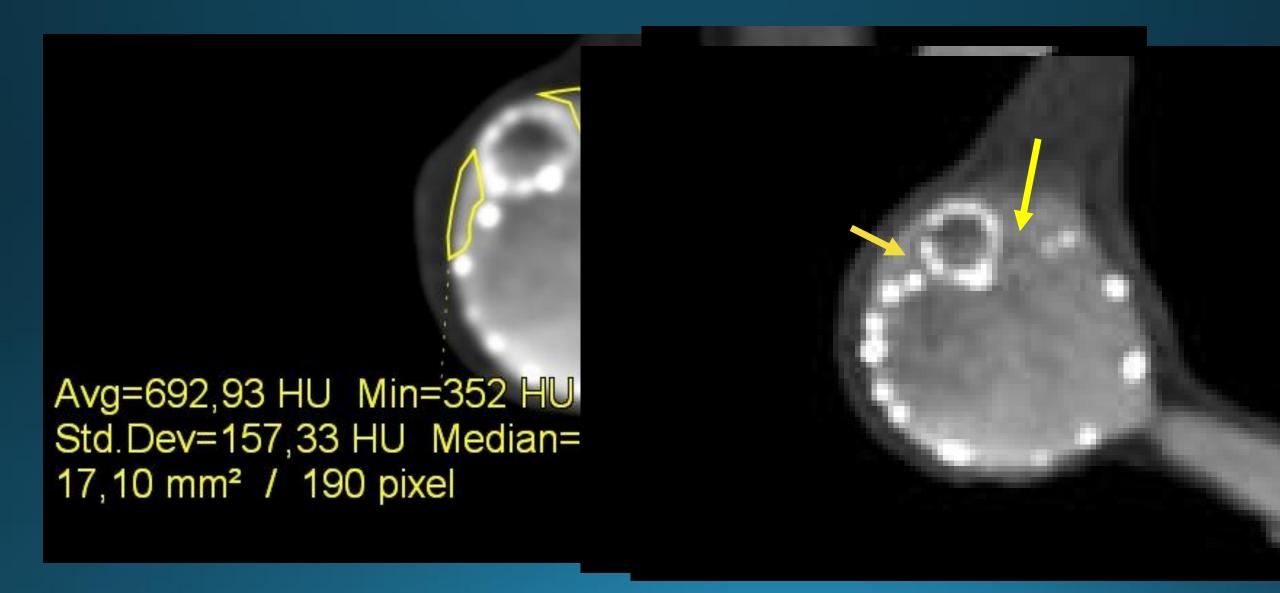




Evaluation of devices combinations

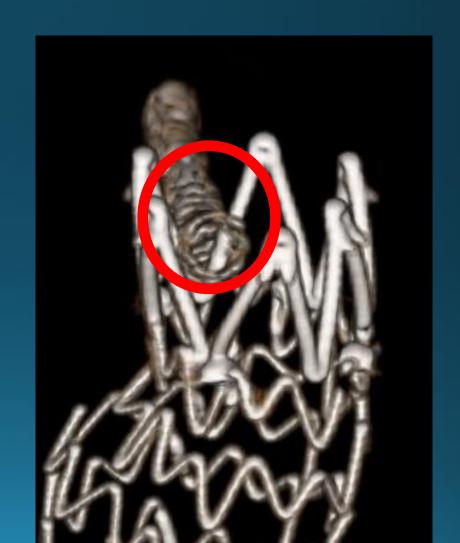
- Incraft and Advanta V12
- Endurant with Advanta V12

Incraft and Advanta V12



Endurant and Advanta V12





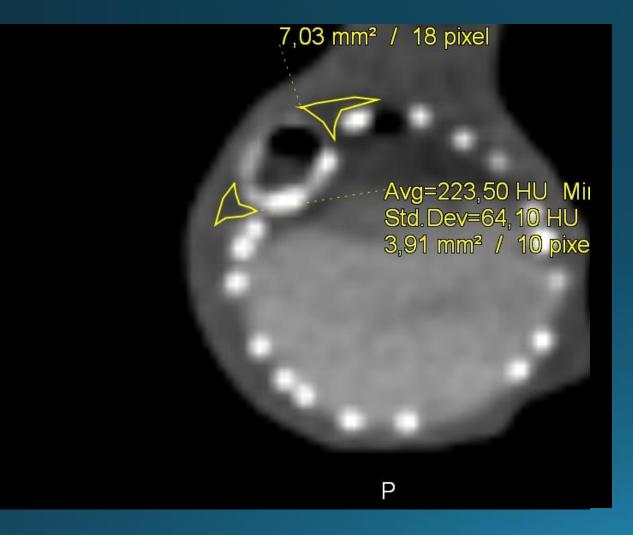
Evaluation of devices combinations

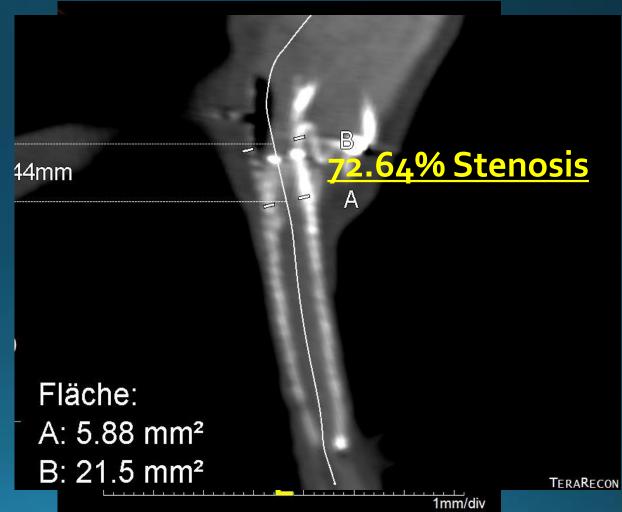
• Endurant with lined Viabahn

Endurant and Viabahn lined with bare stents

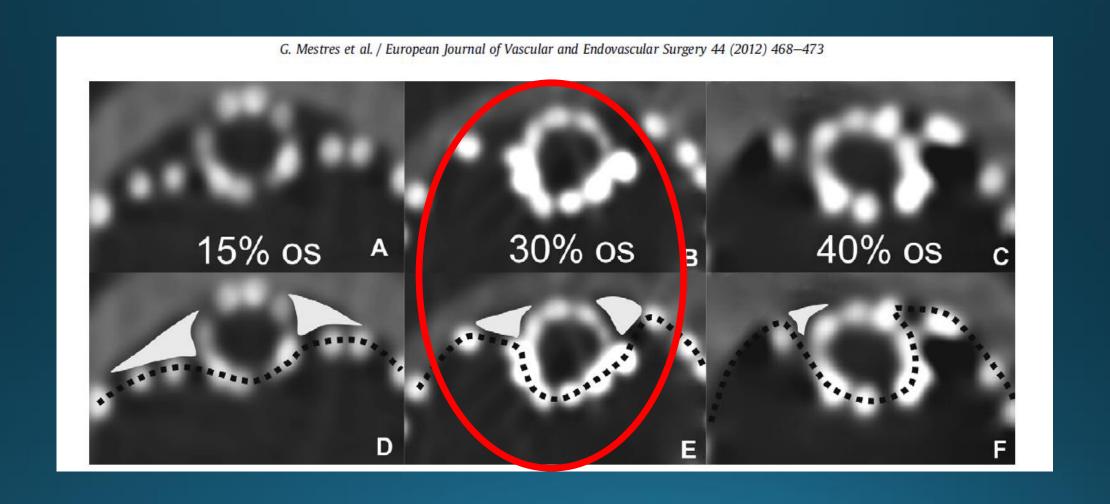


Endurant and Viabahn lined with SES

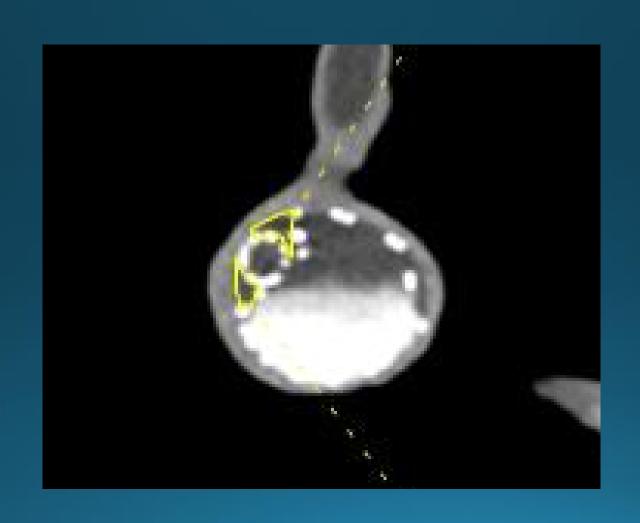




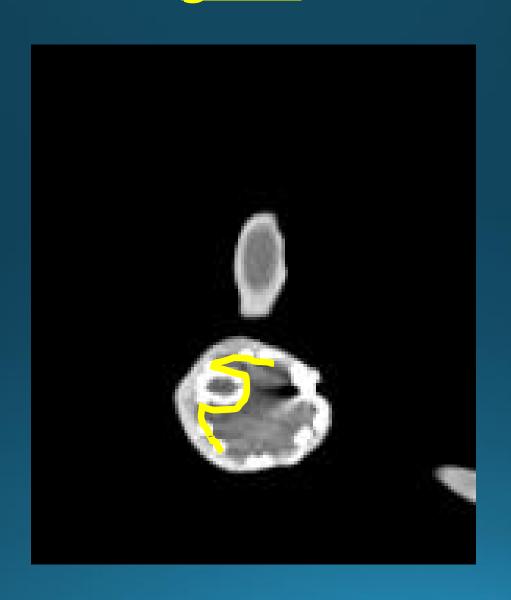
IMPACT OF DEGREE OF OVERSIZING



Endurant 15% OVERSIZING



Endurant 30% OVERSIZING



Synopsis

- New findings about ch-EVAR from PERICLES Registry cohort:
- - Classification of gutter-related endoleaks
- - Low incidence of clinical-driven cerebrovascular events
- Bilateral access as in multiple chimneys high risk of increased MACE rate
- Multiple chimneys and lined chimney graft seem to have significant higher chimney occlusion rate

Synopsis

- New findings about ch-EVAR from PERICLES Registry cohort:
- In vitro evidence about chimney grafts is the next big scientific thing
- - First tests show advanced performance of Advanta V12 in combination with nitinol endoskeleton of abdominal stent-grafts

Hostile proximal and distal anatomy

New SVS guidelines

 «However, fenestrated, branched, <u>and chimney</u> or snorkel grafts have expanded the range of complex aortic anatomy potentially treatable by EVAR»

SOCIETY FOR VASCULAR SURGERY® DOCUMENT

The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm



Elliot L. Chaikof, MD, PhD,^a Ronald L. Dalman, MD,^b Mark K. Eskandari, MD,^c Benjamin M. Jackson, MD,^d W. Anthony Lee, MD,^e M. Ashraf Mansour, MD,^f Tara M. Mastracci, MD,^g Matthew Mell, MD,^b M. Hassan Murad, MD, MPH,^h Louis L. Nguyen, MD, MBA, MPH,ⁱ Gustavo S. Oderich, MD,^j Madhukar S. Patel, MD, MBA, ScM,^{a,k} Marc L. Schermerhorn, MD, MPH,^a and Benjamin W. Starnes, MD,^l Boston, Mass; Palo Alto, Calif; Chicago, Ill; Philadelphia, Pa; Boca Raton, Fla; Grand Rapids, Mich; London, United Kingdom; Rochester, Minn; and Seattle, Wash