Evaluating the optimal combination of aortic endografts and chimney devices: Insights from PERICLES Registry

Konstantinos P. Donas, MD
Münster, Germany
Disclosure

Speaker name:

......K. Donas...........................................................................

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
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.

• «However, fenestrated, branched, and chimney or snorkel grafts have expanded the range of complex aortic anatomy potentially treatable by EVAR»
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 Lackat, MD, Giovanni Torisello, 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 (s-b-EVAR).

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

Results: A total of 179 patients in US centers and 308 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, 696 chimney grafts (49.2% balloon expandable, 36.6% self-expanding covered stents, and 11.9% balloon expandable bare metal stents) were placed in 697 renal arteries, 56 superior mesenteric arteries (SMA), and 50 celiac arteries. At a mean follow-up of 17.1 months, primary patency was 99%, with secondary patency of 93.3%. Overall survival of patients in this high-risk cohort with open repair at latest follow-up was 89%.

Conclusions: This global experience represents the largest series in the EVAR literature and demonstrates comparable outcomes to those published in reports of branched/fenestrated devices, suggesting the appropriateness of broader applicability and the need for streamlined cost-effective solutions. These results support s-b-EVAR as a viable off-the-shelf and immediately deployable 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, branched, vascular

The snorkel/chimney technique is an endovascular therapeutic modality for branch revascularization in complex aortic pathologies that has gained increasing popularity since its first publication in 1999 and 2002. These techniques have evolved from the basic
Identification of optimal device combinations for the chimney endovascular aneurysm repair technique within the PERICLES registry

Salvatore T. Scali, MD, Adam W. Beck, MD, Giovanni Torsello, MD, Mario Lachat, MD, Paul Kubilis, MS, Frank J. Veith, MD, Jason T. Lee, MD, and Konstantinos P. Donas, MD, on behalf of the PERICLES investigators, Gainesville, Fla; Birmingham, Ala; Münster, Germany; Zurich, Switzerland; New York, NY; and Palo Alto, Calif
Identification of optimal device combinations for the chimney endovascular aneurysm repair technique within the PERICLES registry

Salvatore T. Scali, MD, Adam W. Beck, MD, Giovanni Torsello, MD, Maria Lichat, MD, Paul Kubitza, MD, Frank J. Veith, MD, Jason T. Lee, MD, and Konstantinos P. Donal, MD, on behalf of the PERICLES investigators, Gainesville, Fla; Birmingham, Ala; Munster, Germany; Zurich, Switzerland; New York, NY; and Palo Alto, Calif.

ABSTRACT

Objective: 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 aortic aneurysms.

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 Ia endoleak. (J Vasc Surg 2018;■:3-12.)
NEED FOR EVALUATION OF CHIMNEY TECHNIQUE

EVALUATION OF BEST COMBINATIONS BETWEEN ABDOMINAL AND CHIMNEY GRAFTS
Symptomatic para-anastomotic aneurysm of 6.9 cm diameter
Preoperative CTA was used for the creation of a silicon model with a morphology similar to the anatomy of the treated case.
Connection of the silicon model with a **pulsatile pump unit** simulating blood flow
Fluid simulation system
The device can be exposed to **computed tomography** and offers the option for injection of contrast medium performing additional an **angiography (CTA)**.
CT Angiography

Injection of contrast medium
Evaluation of **different abdominal** devices combinations with Advanta

• **Incraft** and **Advanta V12**

• **Endurant** and **Advanta V12**
Incraft and Advanta V12

Parallel configuration

Avg=692.93 HU  Min=352 HU  Max=1102.93 HU
Std.Dev=157.33 HU  Median=731.46 HU
17.10 mm² / 190 pixel
Endurant and Advanta V12
Evaluation of different chimney devices combinations with Endurant

- **Endurant** with self-expanding covered stents *(Viabahn)*
- **Endurant** with balloon expandable covered stents *(Begraft and Begraft plus)*
Endurant with Viabahn (lined with bare stents)
Endurant with (Viabahn lined with bare stents)

72.64% Stenosis

Fläche:
A: 5.88 mm²
B: 21.5 mm²
Endurant with **balloon expandable chimney grafts**
Begraft

Begraft plus
Impact of degree of aortic stent-graft oversizing
Endurant 15% OVERSIZING
Endurant 30% OVERSIZING
Synopsis

• First in vitro tests highlight the importance of chimney devices
• combinations
• explaining the different experiences with chimney devices
Thank you very much

Research team
Project: "in vitro testing chimney endografting"

KP Donas, MD, G.F. Torsello, MD, G.T. Taneva, MD, M. Usai, MD, F. Azevedo, G. Torsello, MD