F-EVAR vs Ch-EVAR for Pararenal AAA Debate: Pro FEVAR







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Defining the Problem

Pararenal AAA

Complex AAA with short/no infrarenal neck Suprarenal AAA



Advanced Endovascular Options

F-EVAR

Ch-EVAR







In my opinion no comparison possible...
 Why CHEVAR if suitable for FEVAR?

Always situations where CHEVAR an option
 Acute/anatomical/set-up

Disclosures

- We do FEVAR and CHEVAR.... and Open
 No doubt FEVAR first choice when "suitable"
- Opponents' hospital: idem
 - Different balance
 - Financial incentive?
 - Scientific incentive?
 - Other reasons?
- (University) Hospitals in rich countries
 - with no FEVAR policy?



F-EVAR vs Ch-EVAR Comparison Criteria



- Technique Efficacy Operative Outcomes
- Technique Complexity
- Costs
- Experience , Long-term Evaluation

Proximal Type I Endoleak

	F-EVAR	Ch-EVAR	р	
Outcomes				
Primary target vessel preservation	98.6%	98%	NS	
Mortality at 30 days	2.4%	5.3%	NS	
Renal impairment	9.8%*	12%	<0.001	
New-onset dialysis	1.5%*	2.1%	<0.001	
Cardiac complications	3.7%*	7.4%	<0.001	
Pulmonary complications	2.3%*	3.2% [†]	*†<0.001	
Stroke	0.3%†	3.2%*†	*0.002, [†] 0.012	
Early proximal type I endoleak	4.3%	10%	0.002	
Estimated blood loss, L [‡]	0.2-0.8	0.35-0.4	NA	
ICU LOS, d [‡]	0.8–1 [§]	1	NA	
Hospital LOS, d [‡]	3–9	4–8	NA	

Katsargyris et al. J Endovasc Ther 2013;20:159–169

Proximal Endoleak in Ch-EVAR

- Moulakakis K et al. *J Vasc Surg 2012* 14%
- Antoniou GA et al. *Vascular 2012* 13%
- Katsargyris A et al. *J Endovasc Ther 2013* 10%
- Wilson et al. *Br J Surg 2013* 10%
- Donas K et al. *J Endovasc Ther 2012* 2%

Unavoidable Gutters



Gutter low flow Endoleaks = Benign Endoleaks?

The Chimney Technique in Endovascular Aortic Aneurysm Repair: Late Ruptures After Successful Single Renal Chimney Stent Grafts

Ann Vasc Surg 2013

Andrew Schiro,¹ George A. Antoniou,¹ David Ormesher,¹ Adam C. Pichel,² Finn Farquharson,¹ and Ferdinand Serracino-Inglott,^{1,3} Manchester, United Kingdom



2/9 (22%) Patients Low-flow Endoleak \rightarrow Rupture \rightarrow Death

Perioperative Stroke

	F-EVAR	Ch-EVAR	р
Outcomes			
Primary target vessel preservation	98.6%	98%	NS
Mortality at 30 days	2.4%	5.3%	NS
Renal impairment	9.8%*	12%	< 0.001
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Ch-EVAR & Stroke

• Upper access

- Multiple passages of devices





F-EVAR vs Ch-EVAR Comparison Criteria



- Technique Efficacy Operative Outcomes
- Technique Complexity
- Costs
- Experience , Long-term Evaluation

F-EVAR requires complex planning but Ch-EVAR not...

Is this simple??



Prof. Lachat, Oral Communication 2011

F-EVAR requires complex planning but Ch-EVAR not...

Is this really a disadvantage?

Failing to plan is planning to fail.



Unplanned Ch-EVAR Endoleak & Occluded Chimney





FEVAR not more complex...

- Cook (and others) provide
 - Planning Center: Indication and Planning
 - Support with Execution
 - Proctoring
 - Visit of large volume centers

Logistics and Organisation needed
 – Same for CHEVAR

Ch-EVAR Everywhere F-EVAR only in Selected Centers

INVITED COMMENTARY

Centralisation: Putting Patients First

P. Holt*, M.M. Thompson



"If centralisation does not follow, then health services and the medical profession will have failed their patients"

Complexity of pararenal AAA calls for centralisation



F-EVAR vs Ch-EVAR Comparison Criteria



- Technique Efficacy Operative Outcomes
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Ch-EVAR ↓ Initial Cost...



Ch-EVAR (x2) ≈ 9.000 € F-EVAR (x2) ≈ 16.000 €

Coscas et al. J Vasc Surg 2011;53:1520-7

Follow-up & Costs for Reintervention?

Long-term postplacement cost after endovascular aneurysm repair

Robert E. Noll, Jr, MD,^a Britt H. Tonnessen, MD,^a Krishna Mannava, MD,^a Samuel R. Money, MD, MBA,^b and W. Charles Sternbergh III, MD,^a New Orleans, La; and Scottsdale, Ariz

(J Vasc Surg 2007;46:9-15.)

5x Increased follow-up cost in case of endoleak

 \rightarrow Overall Costs (OP + F/U): F-EVAR \approx < Ch-EVAR



F-EVAR vs Ch-EVAR Comparison Criteria



- Technique Efficacy Operative Outcomes
- Technique Complexity
- Costs
- Experience, Long-term Evaluation

F-EVAR Branch Durability Published results up to 8 years

Visceral stent patency in fenestrated stent grafting for abdominal aortic aneurysm repair

Frederike A. B. Grimme, MD,^{a,b} Clark J. Zeebregts, MD, PhD,^a Eric L. G. Verhoeven, MD, PhD,^{c,d} Foppe Bekkema, MANP,^a Michel M. J. P. Reijnen, MD, PhD,^b and Ignace F. J. Tielliu, MD, PhD,^a Groningen and Arnhem, The Netherlands; Nürnberg, Germany; and Leuven, Belgium

(J Vasc Surg 2014;59:298-306.)

Durability of branches in branched and fenestrated endografts

Tara M. Mastracci, MD, Roy K. Greenberg, MD, Matthew J. Eagleton, MD, and Adrian V. Hernandez, PhD, Cleveland, Ohio

(J Vasc Surg 2013;57:926-33.)

Ch-EVAR Branch Durability Scarce mid-term data

Review



Current Evidence Regarding Chimney Graft Occlusions in the Endovascular Treatment of Pararenal Aortic Pathologies: A Systematic Review With Pooled Data Analysis

Journal of Endovascular Therapy I-5 © The Author(s) 2015 Reprints and permissions: sagepub.com/journalsPermissions.nav DOI: 10.1177/1526602815581161 www.levt.org

SAGE

Marco V. Usai, MD¹, Giovanni Torsello, MD^{1,2}, and Konstantinos P. Donas, MD, PhD^{1,2}

- 334 Vessels, <u>F/U: 14.4 months</u>
- Occlusion: 15 (4.5%), mean time: 3.5 months

- 1 Death (SMA Occlusion)

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

(Ann Surg 2015;262:546-553)

- 2008-2014, Europe & USA
- 517 patients, 898 Chimneys
 - <u>1.73 chimneys per patient</u>

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

(Ann Surg 2015;262:546-553)

- Technical Success: 97.1%
 - Type Ia Endoleak Intraop: 7.9%
 - Persisting Type Ia Endoleak: 2.9%

(despite corrective measures)

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

(Ann Surg 2015;262:546-553)

- <u>30d Mortality: 4.9%</u>
 - Acute: 24.1%
 - <u>Elective: 3.7%</u>
- <u>Stroke: 1.7%</u>

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

(Ann Surg 2015;262:546-553)

- Follow-up: 17.1 ± 8.2 months
 - 15.5% Late mortality, 4 related deaths
 - bowel ischemia (n=3), graft infection (n=1)
 - Late conversion: 5
 - Infection (n=2), Endoleak Ia (n=2), Endotension (n=1)

The PERICLES Registry

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Response From J.T. Lee:

We agree that the more snorkel/chimneys, the increasing risk for gutter type Ia endoleak. Basically, 1 snorkel graft works nearly perfectly every time, with minimal displacement of the main body endograft and a good seal. For us, <u>2 is probably the maximum that the</u> approach consistently works well. When we've ventured into using 3 or 4 snorkels, you need to consider right-sided arm access, conduit placement in the left arm, increasing stroke issues, and need for longer snorkel grafts. In our series and others, the overall complication rate with 3 and 4 was higher both in the immediate term and in the follow– up compared to 1 or 2 snorkels.

\rightarrow 2 Chimneys Maximum!!

Fenestrated Endovascular Aortic Aneurysm Repair as a First Line Treatment Option to Treat Short Necked, Juxtarenal, and Suprarenal Aneurysms

E.L.G. Verhoeven ^{a,*}, A. Katsargyris ^a, K. Oikonomou ^a, G. Kouvelos ^a, H. Renner ^a, W. Ritter ^b

^a Department of Vascular and Endovascular Surgery, Paracelsus Medical University, Nuremberg, Germany ^b Department of Radiology, Paracelsus Medical University, Nuremberg, Germany

Eur J Vasc Endovasc Surg (2016) ■, 1-7

- 5-years experience with FEVAR
- 281 pts

Stent-graft Design

- <u>Renal</u> Fenestrations (+SMA Scallop)
 N=183 (65.1%)
- <u>Renal + SMA</u> Fenestrations + (Celiac Scallop)
 N=91 (32.4%)
- <u>Renal + SMA + Celiac</u> Fenestrations
 N=7 (2.5%)





Technical Success

• N=272/281 (96.8%)

Including 2 Retrograde renal artery catheterisations

30-Day Mortality

• <u>N=2 (0.7%)</u>

- Cardiac (MI, intraop)
- -MOF
 - Renal bleeding postop.

Follow-up Data Mean duration: 21 ± 15.9 months

Target Vessel Patency



Estimated Patency 98.6 ± 0.5% at 1 year 98.1 ± 0.7% at 3 years

Reinterventions (N=15)

Reintervention	N	
Target vessel relining/extension	5	
Coil embolization (Type II Endoleak)	3	73%
Iliac PTA	1	
Distal stent-graft extension (Type Ib Endoleak)	1	
Cuff+ Chimney+ Endoanchors (Type Ia Endoleak)	1	
Femoral TEA	1	27%
Laparotomy for lumbar ligation (Type II Endoleak)	1	
Conversion (Type Ib Endoleak)	1	OFLIN
Iliac Thrombectomy	1	

Freedom from Reintervention



96.1 ± 1.4% at 1 year 90.0 ± 2.7% at 3 years

Nuremberg Series update Stent-graft Design in 333 FEVAR Patients

<u>Standard 2x FEVAR</u>
 N=196 (58.9%)

<u>Complex 3x-4x FEVAR</u>
 – N=137 (41.1%)





Evolution of Stent-graft Design



 \uparrow Use of 3x-4x FEVAR over the years...

Durability Issues

• Taking "created" neck length into account

Taking risk of "progression of disease" into account

Conclusions

- No Comparison possible
 - Different patient groups
 - FEVAR "creates" a longer neck
 - FEVAR most likely more durable
 - FEVAR lower M&M
- CHEVAR for selected cases only & in regions where FEVAR not available/affordable?

Everything should be made as simple as possible, but not simpler.

Albert Einstein

Snorkel only what you can't fenestrate...

21st international experts symposium **CRITCAL ISSUES** in aortic endografting 2017



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Critical Issues 2017 will take place on May 19 and 20, 2017 in Nuremberg, Germany

Visit our website: www.critical-issues-congress.com