




Aortic Endograft Diameter Sizing With Ruptured Aneurysms: Why Is It Different And How To Do It?

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Disclosure

Nothing to disclose

**First Endo Repair (EVAR) for RAAA in world:
CTA on 21. April 1994**




Inoperable Patient
Hostile Abd
EF 16%
BP 60 mmHg
Severe Pain

Picture Courtesy of Frank Veith

University of Zurich

**Frank J. Veith: MEGS
Montefiore Endovascular Grafting System**



Prefabricated and kept sterile for emergent use

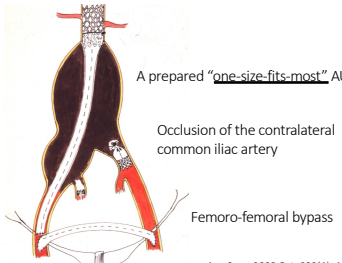
Palmaz stent (Cordis, NJ) sutured to PTFE graft
ePTFE graft standard wall thickness (JMPRA, AZ)
PTA Balloon (Maxi, Cordis)

EARLY MEGS VI GRAFT
1993-1994

Ann Surg. 2000 Oct; 232(4): 466-479.

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**Frank J. Veith: MEGS
Montefiore Endovascular Grafting System**



A prepared "one-size-fits-most" AUF PTFE graft

Occlusion of the contralateral common iliac artery

Femoro-femoral bypass

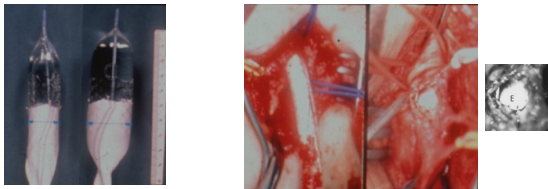
Inclusion criteria for EVG

1. infrarenal neck length > 10 mm
2. infrarenal neck diameter < 28 mm
3. No long bilateral iliac arteries occlusions
4. No mycotic aneurysms

Ann Surg. 2000 Oct; 232(4): 466-479.

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**Frank J. Veith: MEGS
Montefiore Endovascular Grafting System: Versatility**



2 ATM = 20mm 6ATM = 28mm

EVG limb long enough limb cut and sutured

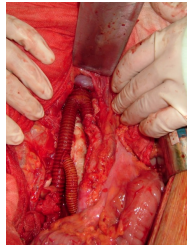
Customizing proximal stent diameter Tailoring Graft length

Ann Surg. 2000 Oct; 232(4): 466-479.

Pictures Courtesy of Frank Veith

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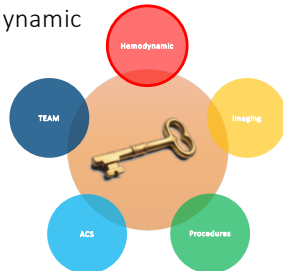
Open surgery for AAA (elective and emergent)
Sizing issue almost does not exist



Emergent EVAR
Sizing issue



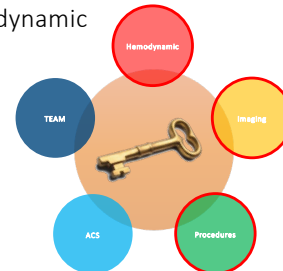
Emergent EVAR
Sizing issue and hemodynamic



MARZ (Management of Aortic Rupture Zurich) UHZ/ESVS



Emergent EVAR
Sizing issue and hemodynamic



MARZ (Management of Aortic Rupture Zurich) UHZ/ESVS



Patient



Male
45 year old
BP 60/40 mm Hg
Conscious
Permissive
hypotension



Patient



BD 60/40 mmHg
CTA at Admission

17.3 x 18.3 mm

Aorta 1cm above RA

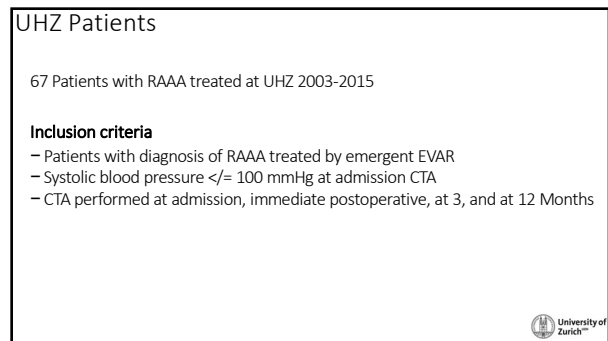
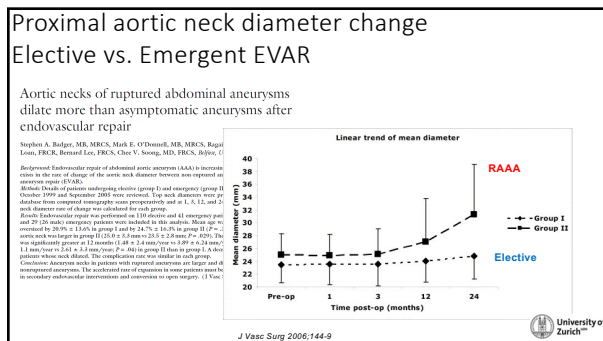
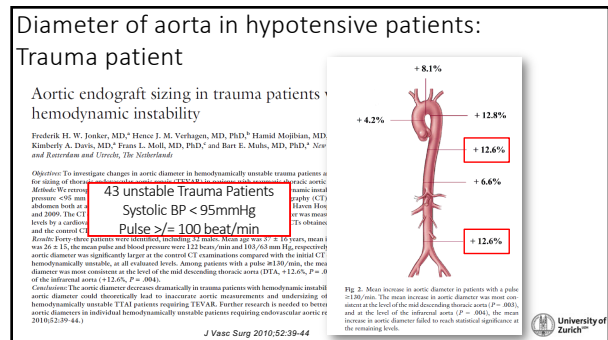
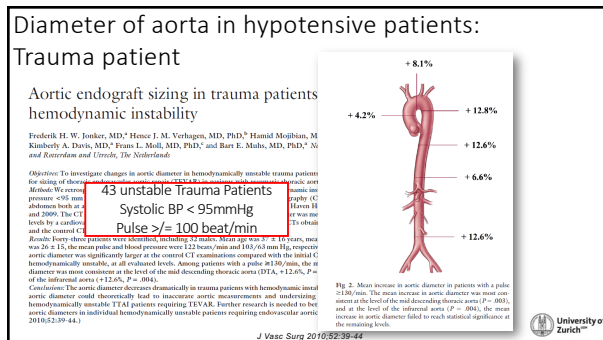
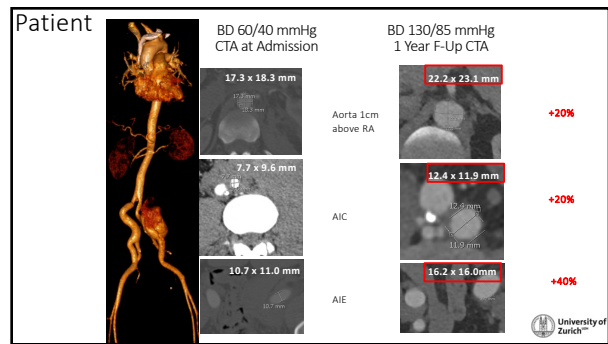
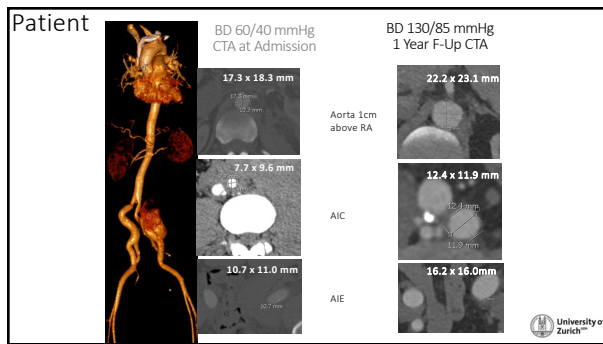
7.7 x 9.6 mm

AIC

10.7 x 11.0 mm

AIE





UHZ Patients

67 Patients with RAAA treated at UHZ 2003-2015

Inclusion criteria

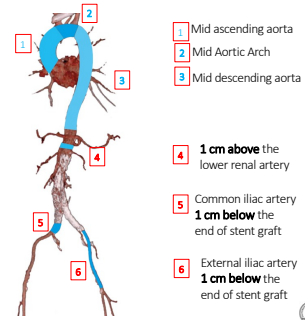
- Patients with diagnosis of RAAA treated by emergent EVAR
- Systolic blood pressure \leq 100 mmHg at admission CTA
- CTA performed at admission, immediate postoperative, at 3, and at 12 Months

Exclusion patients

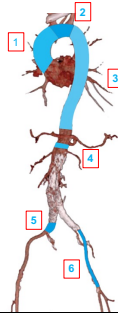
- Pararenal Aneurysms treated with chimney and periscope
- Previously conventional open surgery for aortic pathology
- Incomplete CTA data sets



UHZ Patients



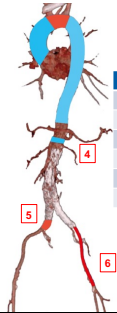
UHZ Patients: Results



Segment	Immediate	3 Mo	12 Mo
1 Ascending	+2	+4	+6
2 Arch	+2	+5	+11
3 Descending	+4	+4	+5
4 1 cm above Renal	+6	+6	+6
5 AIC	+6	+8	+8
6 AIE	+10	+10	+13



UHZ Patients: Results



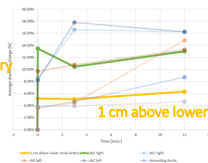
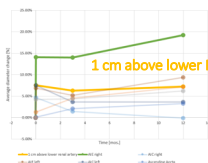
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UHZ Patients: Age subgroup and Aortic diameter

Age < 70 yrs. (24 patients)

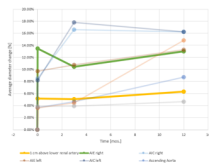
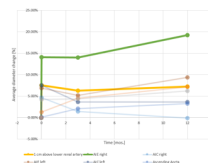
Age \geq 70 yrs. (43 patients)

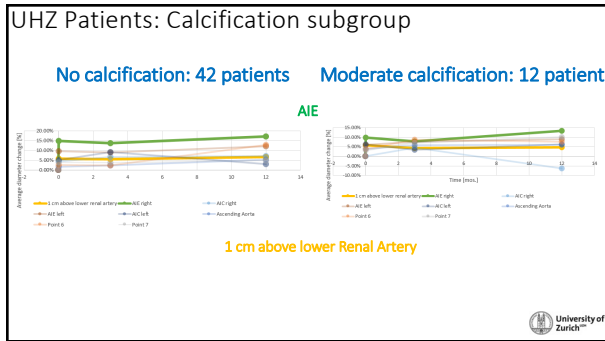


UHZ Patients: Age subgroup and AIE diameter

Age < 70 yrs. (24 patients)

Age \geq 70 yrs. (43 patients)





Clinical implication of proximal endografts sizing: Elective EVAR (systematic review)

Elective EVAR for AAA

- 23 relevant articles
- 8.415 patients

10-20% oversizing regime is safe and preferable (↓ risk of proximal EL)

>30% oversizing might be negative after EVAR (↑ migration risk and neck dilatation)

Studies of higher quality are needed

Eur J Vasc Endovasc Surg 2009;38:42-52

Clinical implication of proximal endografts sizing: Emergent EVAR

Emergent EVAR for AAA

Ann Vascular Surg 2016; 30:308 e5-308 310

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Aortic neck: Supra- and Infra-Renal Emergent EVAR

74 patients RAAA, 2010-2019

23 with hypovolemic shock (SBP<90mmHg)

Diameter Aorta from lowest renal artery +10mm, and -20mm +10mm and +40mm

Second CTA available in 42% (FU ?)

J. Clin. Med. 2022, 11, 1203

ESVS Guidelines and endografts sizing in RAAA

Recommendation 76 New

Patients undergoing endovascular repair for a ruptured abdominal aortic aneurysm in whom imaging was performed during permissive hypotension, should be considered for stent graft oversizing of up to 30%.

Class	Level	References	ToE
IIa	C	van der Riet et al. (2022) ¹⁰	

Eur J Vasc Endovasc Surg [2024] 67, 192e331

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Clinical implication of distal endografts sizing: Emergent EVAR

Aortic morphology & 3 year re-interventions

weak association between neck length & re-interventions

strong association between iliac diameter & re-interventions

Morphological variable	Re-interventions	Time to any AAA-related re-intervention OR (95%CI)		
		EVAR commenced n=112	Open commenced n=20	Combined n=132
Maximum AAA diameter (per 17mm increase)	all	0.97 (0.72, 1.32) P=0.86	0.95 (0.77, 1.16) P=0.65	0.95 (0.80, 1.12) P=0.32
	arterial	1.02 (0.74, 1.39) P=0.94	0.85 (0.66, 1.09) P=0.21	0.90 (0.74, 1.09) P=0.28
Aneurysm neck length (per 16mm increase)	all	0.80 (0.58, 1.10) P=0.18	0.86 (0.72, 1.10) P=0.28	0.87 (0.73, 1.03) P=0.12
	arterial	0.74 (0.53, 1.04) P=0.08	0.89 (0.69, 1.16) P=0.40	0.84 (0.69, 1.03) P=0.09
Maximum common iliac diameter (per 5mm increase)	all	1.32 (1.01, 1.72) P=0.041	1.06 (0.91, 1.24) P=0.45	1.11 (0.98, 1.26) P=0.11
	arterial	1.48 (1.13, 1.93) P=0.004	1.11 (0.92, 1.35) P=0.28	1.20 (1.04, 1.39) P=0.013

Eur J Vasc Endovasc Surg 2018;55(5):625-632

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Clinical implication of distal endografts sizing:
Emergent EVAR

Aortic morphology & 3 year re-interventions
 weak association between neck length & re-interventions
 strong association between Iliac diameter & re-interventions

Morphological variable	Re-interventions	Time to any AAA-related re-intervention OR (95%CI)		
		EVAR commenced N=112	Open commenced N=229	Combined N=341
Maximum AAA	all	0.97 (0.72, 1.32)	0.95 (0.77, 1.16)	0.95 (0.80, 1.12)
Maximum common iliac diameter per 5mm increase	arterial	0.74 (0.53, 1.04) P=0.08	0.89 (0.69, 1.16) P=0.40	0.84 (0.69, 1.03) P=0.09
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Maybe it was up to (under)sizing?

Eur J Vasc Endovasc Surg. 2018;55(5):625-632



Conclusion

Diameter of Aorta and Iliac Arteries decrease in hypotensive RAAA patients.

The mean diameter decrease most in CIA (8%), and EIA (13%).

This decrease might result in inadequate sizing in Hypotensive RAAA patients systolic blood pressure < 100 mmHg

Analysis of clinical implications (e.g. EL type I) is essential.




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