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New approaches to the treatment of challenging aortic anatomies

Marc RHM van Sambeek,
Joep AW Teijink, Philippe W Cuypers
Department of Vascular Surgery
Catharina Hospital Eindhoven



Disclosure

Marc RHM van Sambeek

I have the following potential conflicts of interest to report:

Consulting and speakersfee

WL Gore & Associates

Medtronic

Unrestricted research grants

Medtronic

Abbott Vascular

Philips Medical Systems



Reasons for re-intervention

Aneurysm growth

Endoleak

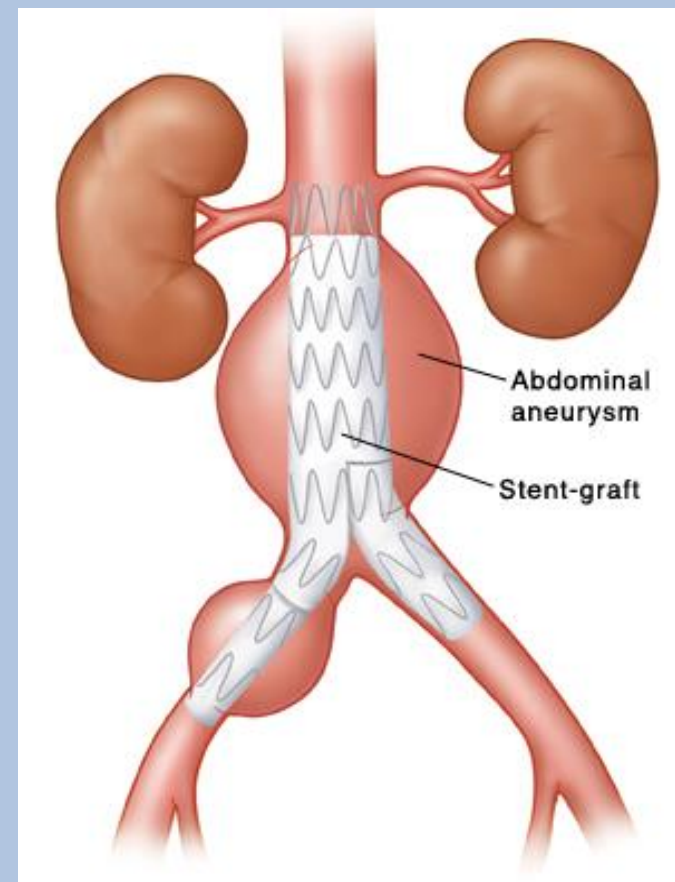
Type I (0.5-13%)

Type II (10-25%)

Type III (0.1-6.4%)

Migration (1-42%)

Kinking and occlusion



What is challenging anatomy?



There's no univocal definition.

In general:

Neck length ≤ 15 mm

– Neck angulation $\geq 60^\circ$

– Double angled necks

– Irregular (thrombus, bulge, calcium)

– Wide (> 28 mm)





Risks of a hostile neck

Planning by using all the available neck length

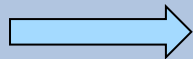
Optimal angulation and rotation of C-arm

Precise (re)positioning

Adapting the strategy to the anatomy

Which are the risks related to treatment of a hostile neck

Endoleak
Migration



Aneurysm rupture

The literature on hostile neck



Liberalized interpretation of the instructions for use is associated with increased risk of aneurysm sac enlargement, which can lead to re-intervention and rupture of the aneurysm

Schanzer A, et al. Circulation. 2011;123:2848-55

In a meta-analysis it was demonstrated that patients treated with hostile neck anatomy were at significantly increased risk for operative morbidity, additional adjunctive procedures at treatment, Type I endoleak at one year, and aneurysm related mortality at one year.

Antoniou GA, et al. J Vasc Surg 2013;57:527-538.

The literature on hostile neck



This real-world, registry shows promising results and indicates that endovascular AAA repair is safe and effective in patients with challenging aortic neck anatomy. However, long-term follow-up of patients is required to confirm results.

Broos P, et al. J Vasc Surg. 2015;62:312-8

Emergency EVAR provides excellent results for treatment of rAAA patients with both FNA and HNA. EVAR in rAAAs with HNA is technically feasible and safe in experienced endovascular centers.

Broos R, et al. EJVES 2015;50:313-9

Challenging anatomy



Variables	REG (n = 925) ^a	INT (n = 189) ^a	CHA (n = 104) ^a	Adjusted OR ^b (95% CI)		
				REG vs INT	REG vs CHA	INT vs CHA
All-cause mortality	6.7 (62/925)	10 (18/189)	10 (10/104)	0.85 (0.48-1.52)	0.71 (0.34-1.49)	0.83 (0.36-1.94)
AAA-related mortality	1.4 (13/925)	1 (2/189)	3 (3/104)	1.18 (0.25-5.46)	0.39 (0.10-1.48)	0.33 (0.05-2.05)
AAA rupture	0.0 (0/925)	1 (2/189)	0 (0/104)	—	—	—
Endoleak type I	0.4 (3/793)	0 (0/153)	1 (1/88)	—	0.92 (0.08-10.38)	—
Endoleak type III	0 (0/793)	1 (1/153)	1 (1/88)	—	—	0.78 (0.04-14.20)
Stent graft occlusion	2.4 (19/793)	1 (2/153)	1 (1/88)	1.71 (0.39-7.49)	2.08 (0.27-16.24)	1.22 (0.11-13.90)
Stent graft stenosis	1.3 (10/793)	1 (1/153)	3 (3/88)	1.63 (0.20-13.19)	0.22^c (0.05-0.92)	0.14 (0.01-1.39)
Stent graft kinking	0.3 (2/793)	0 (0/153)	1 (1/88)	—	0.32 (0.02-4.62)	—
Stent graft migration	0 (0/793)	0 (0/153)	0 (0/88)	—	—	—
Conversion	0.4 (4/925)	1 (2/189)	1 (1/104)	0.47 (0.08-2.83)	0.52 (0.05-5.06)	1.10 (0.10-12.68)
Secondary procedure	5.4 (50/925)	5 (9/189)	9 (9/104)	1.14 (0.55-2.38)	0.59 (0.28-1.27)	0.52 (0.20-1.37)

Broos P, et al. J Vasc Surg. 2015;62:312-8

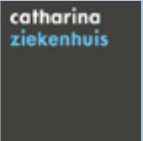


Patient outcome within 30-days by neck anatomy

Variable	FNA (N = 22) ^a	HNA (N = 17) ^a	<i>p</i> -value
Clinical outcome ^c			
Secondary surgical procedures			
Endovascular procedure	4.5% (1/22)	5.9% (1/17)	1.000
Laparotomy for ACS ^d	0% (0/22)	23.5% (4/17)	.029
Conversion to open surgery	4.5% (1/22)	5.9% (1/17)	1.000
Aneurysm rupture	0% (0/22)	5.9% (1/17)	.421
All-cause mortality	13.6% (3/22)	11.8% (2/17)	1.000

Broos P, et al. Eur J Vasc Endovasc Surg: 2015;50:313-9

Catharina Hospital Experience



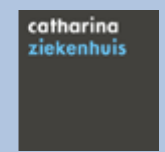
	1995-2001	2002-2006	2007-2012
<i>EVAR</i>	N=185 (50.5%)	N=307 (63,6%)	N=417 (78.6%)
<i>Open repair</i>	N=181	N=176	N=113
<i>Symptomatic</i>	2,2%	3,6%	9,4%
<i>Rupture</i>	2,2%	4,6%	17,3%

Catharina Hospital Experience



	1995-2001 <i>N=185</i>	2002-2006 <i>N=307</i>	2007-2012 <i>N=417</i>
<i>30-D mortality</i>	2,7%	6,2%	2,6%
<i>Re-interventions</i>	31,4%	16,3%	7,6%
<i>Follow up</i>	90 months [0-16 year]	64 months [0-10,5 year]	24 months [0-5,5 year]

Catharina Hospital Experience



<i>Indication</i>	1995-2001 N=185	2002-2006 N=307	2007-2012 N=417
<i>Endoleak Type I</i>	8,6%	3,9%	1,2%
<i>Endoleak Type II</i>	3,8%	1,3%	1,2%
<i>Endoleak Type III</i>	7%	0,7%	0,7%
<i>Migration</i>	8,6%	2,3%	0,2%

Catharina Hospital Experience



	>15 mm neck length	10-15 mm neck length	5-10 mm neck length	< 5 mm neck length
<60° neck angulation	Green	Green	Light Green	Red
60-90° neck angulation	Green	Light Green	Yellow	Red
> 90° neck angulation	Green	Light Green	Red	Black

Influenced by:
thrombus
calcification
bulging
double angle
compasionate use

Conclusion



Challenging anatomy can be treated with good success

Applicability of EVAR in challenging anatomy is depending on multiple factors

Experience in challenging anatomy is a key issue

With newer generations of endografts, the applicability of EVAR will increase



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