Update On Treating All (100%) Ruptured AAAs, Complex AAAs And Thoracic Aneurysms Endovascularly: A 15-Year Experience Shows This Is The Best Treatment And Lowers The Turndown Rate: What Adjuncts May Be Necessary To Achieve This

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Conflict of interest

- None

"No ego, just good science, clinical care and collaboration"

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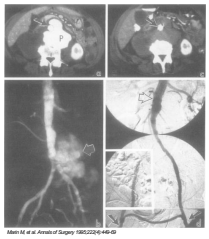
First EVAR in rAAA (1995)

Initial Experience with Transluminally Placed Endovascular Grafts for the Treatment of Complex Vascular Lesions

Michael L. Marin, M.D., Frank J. Veith, M.D., Jacob Cynamon, M.D., Luis A. Sanchez, M.D., Ross T. Lyon, M.D., Barry A. Levine, M.D., Curtis W. Bakal, M.D., William D. Suggs, M.D., Kurt R. Wengerter, M.D., Steven P. Rivers, M.D., Richard E. Parsons, M.D., John G. Yuan, M.D., Reese A. Wain, M.D., Takao Ohki, M.D., Alla Rozenblit, M.D., and Juan C. Parodi, M.D.



Marin M et al. Annals of Surgery 1995;222(4):449-69

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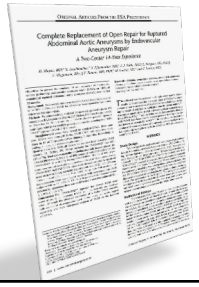
Complete replacement of Open Repair for rAAA



30-day mortality (2009 – 2011)	
Total	24.3%
Örebro	28.2%

Turndown rate: 4%

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Single center experience

Aim: To evaluate the feasibility, technical success and clinical outcome of EVAR at a single center when exclusively performed for all rAAA during a 12-year period.

Demonstrated the applicability of EVAR for the treatment of **all** rAAAs at suitable centers

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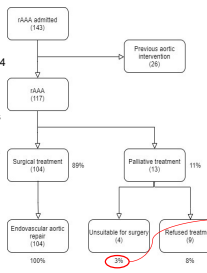
EVAR in 100% surgically treated rAAA 2009-2024

- Single center retrospective observational study
- All patients presenting to Örebro University Hospital with a rAAA between October 2009 and October 2024
- Not included:
  - Isolated iliac artery ruptures
  - Thoracic and thoracoabdominal aortic ruptures
- Excluded:
  - Previous aortic interventions in infrarenal aorta (open or endovascular)
  - Patients receiving palliative treatment



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8.1. Definition and indications for repair of complex abdominal aortic aneurysms

Abdominal aortic aneurysms involving the renovisceral segment (without the involvement of the thoracic aorta) are collectively termed complex AAAs and include the following subgroups (Fig. 8).[125]

- Short neck infrarenal AAA: with an infrarenal aortic neck 4 – 10 mm in length.
- Juxtarenal AAA: with an infrarenal aortic neck < 4 mm in length, without direct involvement of the renal arteries.
- Pararenal AAA: with the involvement of at least one of the renal arteries but not the SMA.
- Paravisceral AAA: with the involvement of the renal arteries and the SMA, but not the coeliac artery.
- Suprarenal AAA: pararenal and paravisceral AAAs are frequently grouped together as suprarenal AAA.
- Type IV TAAA: with the involvement of the renal arteries, the SMA, and the coeliac artery. Thus, TAAA IV involves the entire abdominal aorta from the level of the diaphragm to the aortic bifurcation.

Wanhainen et al - ESVS 2024 Management Guidelines of Abdominal Aorto-Iliac Artery Aneurysm

Patient Characteristics	All (n = 104)
Preoperative data	
Background	
Age at operation, mean years (SD)	76 (8)
Male, n (%)	76 (73)
Pre-op aneurysm diameter, mean mm (SD)	75 (17)
Diabetes, n (%)	11 (11)
Smoking, n (%)	
- Active, n (%)	26 (25)
- Previous, n (%)	27 (26)
- Never, n (%)	9 (9)
Cardiac disease, n (%)	36 (35)
Renal disease, n (%)	9 (9)
Aneurysm characteristics	
Aneurysm location	
- *Infrarenal*, n (%)	71 (68)
- *Short infrarenal*, n (%)	19 (18)
- *Juxtarenal*, n (%)	12 (12)
- *Pararenal*, n (%)	2 (2)
Admission data	
Unconscious, n (%)	44 (42)
Hemodynamic instability, n (%)	59 (57)
CPR, n (%)	6 (6)
Perioperative data	
Anesthesia	
• *Local anesthesia only*, n (%)	67 (4)
Type of vascular access	
• *Percutaneous*, n (%)	102 (98)
ABO, n (%)	21 (20)

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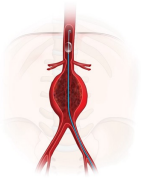
Hemodynamic instability

57% of rAAA - SBP <90 mmHg
- on admission or before surgery

20% received REBOA/ABO
- Target SBP of 90 mmHg
- Partial occlusion if possible



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Hostile proximal neck anatomy

Length <10 mm 24%
Infrarenal angulation >60° 26%
Conical aortic 15mm neck 2%
(<3 mm increase in diameter for every 10 mm in length)

ESVS and SVS guidelines:
- 42% with a Hostile neck

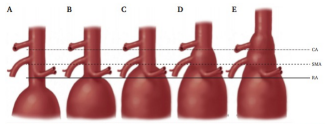

Figure 8. Anatomical classification of complex abdominal aortic aneurysms (AAAs) based on the proximal extensions of the aneurysm and their relationship with the renal arteries (RAs), the superior mesenteric artery (SMA), and the coeliac artery (CA). (A) Short neck infrarenal AAA. (B) Juxtarenal AAA. (C) Pararenal AAA. (D) Paravisceral AAA. (E) Type IV thoraco-abdominal aortic aneurysm. Pararenal and paravisceral AAAs are frequently grouped together as suprarenal AAA. Permission to reproduce granted from Elsevier / Vine Berg.[125]

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Stentgraft

COOK	5%	Topstent	29%
Medtronic	24%		
Gore	67%	No Topstent	70%
Nellix	3%		

Oversizing, mean % (SD)	18 (11)	
- Topstent, mean % (SD)	19 (12)	p= 0.283
- No Topstent, mean % (SD)	18 (11)	
Violation of IFU, n (%)	56 (54)	
- Topstent, n (%)	14 (25)	p= 0.203
- No Topstent, n (%)	41 (75)	

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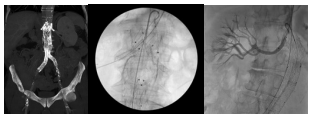
Adjunct techniques

In short infrarenal, juxtarenal and pararenal rAAA
- 31% received parallel grafts
- Renal arteries were deliberately covered or embolized in 6 patients
- Onyx and other techniques used (Access etc)



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Regression analysis

Aneurysm neck characteristics	All (n = 104)	Post-op Endoleakage OR (95% CI)	p	Mortality 30-days OR (95% CI)	p
Hostile neck, n (%)	45 (43)	0.562 (0.191 – 1.648)	0.426	0.895 (0.356 – 2.253)	0.814
Neck length, mean mm (SD)	17 (14)	1.020 (0.984 – 1.057)	0.283	1.014 (0.981 – 1.048)	0.400
Infrarenal neck angulation >60°, n (%)	27 (26)	0.910 (0.344 – 3.308)	0.910	1.139 (0.421 – 3.084)	0.797
Oversizing <30%, n (%)	7 (69)	0.477 (0.118 – 1.937)	0.301	0.807 (0.222 – 2.928)	0.744
Violation of IFU, n (%)	56 (54)	0.729 (0.254 – 2.095)	0.558	0.878 (0.341 – 2.260)	0.787
Chimney, n (%)	15 (15)	1.800 (0.476 – 6.803)	0.386	0.970 (0.282 – 3.340)	0.961

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Complications

Postoperative data	
	n = 101
Complications at 30 days, n (%)	17 (17)
- *Cardiac infarct, n (%)*	3 (19)
- *CVL, n (%)*	2 (13)
- *Acute kidney injury, n (%)*	11 (69)
- *Multiorgan failure, n (%)*	1 (6)
Endoleakage at 30-days, n (%)	**19 (19)**
- *Type 1, n (%)*	8 (47)
- *Type 2, n (%)*	9 (53)
	n = 104
ICU > 5 days, n (%)	19 (18)
Abdominal compartment, n (%)	20 (19)
Laparotomy, n (%)	19 (18)
Reoperation hemorrhage, n (%)	7 (7)

- 17% where parallel grafts were used
- 1 patient required dialysis

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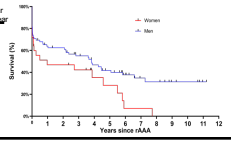
Outcome

Mortality	Mortality In-hospital	Mors tabula	Mortality 24 hours	Mortality 30 days	Mortality 90 days	Mortality 1 year	Mortality 3 years
All EVAR treated rAAA (104), n (%)	24 (23)	11 (11)	19 (18)	28 (27)	33 (32)	41 (40)	49 (52)
rAAA infrarenal (71), n (%)	18 (17)	7 (7)	14 (14)	21 (20)	26 (25)	31 (30)	35 (37)
rAAA ≥80 y (40), n (%)	6 (15)	2 (5)	6 (15)	10 (25)	10 (25)	12 (31)	15 (42)
rAAA <80 y (64), n (%)	18 (28)	9 (14)	13 (20)	18 (28)	23 (36)	29 (45)	34 (53)
rAAA Men (76), n (%)	20 (26)	7 (9)	15 (20)	22 (29)	26 (34)	31 (41)	37 (49)
rAAA Women (28), n (%)	4 (14)	4 (14)	4 (14)	6 (21)	7 (25)	10 (36)	12 (43)

- No significant difference between Men and Women at 1 year
- No significant difference between ≥80 and <80 years at 1 year

Turndown rate: 3%



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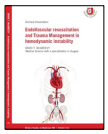
Summary

- Largest contemporary single center study examining the use of EVAR in all patients surgically treated for a rAAA over a 15-year period
- Demonstrates the longstanding feasibility of using endovascular techniques as the primary treatment for **all** rAAA in suitable centers
- A low proportion of rAAA patients considered surgically unsuitable (exclusion rate 3%)
- Violation of IFU not correlated to endoleak or mortality at 30d

Specific IFU for EVAR in rAAA?



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