



Liège I Théâtre de Liège I Belgium www.escvs2022.com





Gender differences in EVAR versus open repair for AAA in the elective and urgent setting

Athanasios D. Giannoukas,

MD, MSc(Lond.), PhD (Lond.), FEBVS Head, Department of Vascular Surgery, Larissa University Hospital, Faculty of Medicine, School of Health Sciences, University of Thessaly, Larissa, Greece

Disclosure

Speaker name: Prof. Athanasios Giannoukas

□ I have the following potential conflicts of interest to report:

□ Receipt of grants/research support

□ Receipt of honoraria and travel support

Participation in a company-sponsored speaker bureau

Employment in industry

□ Shareholder in a healthcare company

Owner of a healthcare company

I do not have any potential conflict of interest

EVAR has shown a successful early and satisfactory long-term results with lower morbidity and mortality compared to OSR



Meta-analysis of individual-patient data from EVAR-1, DREAM, OVER and ACE trials comparing outcomes of endovascular or open repair for abdominal aortic aneurysm over 5 years

J. T. Powell¹, M. J. Sweeting², P. Ulug¹, J. D. Blankensteijn³, F. A. Lederle⁴, J.-P. Becquemin⁵ and R. M. Greenhalgh¹, on behalf of the EVAR-1, DREAM, OVER and ACE Trialists

Baseline and postrandomization characteristics of patients in the four trials

	EVAR-1	DREAM	OVER (n	ACE (<i>n</i> =
	(<i>n</i> =1252)	(<i>n</i> = 351)	= 881)	299)
Baseline variables				
Age (years) [*]	74(6)	70(7)	70(8)	69(7)
Men	1135 (90·7)	322 <u>(91</u> ·7)	876 <u>(99</u> ·4)	296 (99·(

>90% of the participants in EVAR vs OSR RCTs were males

Sex-Related Disparities in Intervention Rates and Type of Intervention in Patients with Aortic and Peripheral Arterial Disease (PAD)



Retrospective analysis of National Inpatient Sample Database



1,021,684 patients with AAA (13%, 21% female), carotid stenosis (40%, 42% female), or PAD (47%, 42% female) undergoing intervention

Less likely for females to undergo surgery for AAA vs. males with same disease*



Less likely for females to undergo surgery for PAD vs. males with same disease*

No difference in treatment rates for carotid artery stenosis.*

Females less likely to receive endovascular procedure vs open surgery for AAA or CAS, more likely to receive one for PAD

*After accounting for disease prevalence



25%

30%

McGinigle et al. J Vasc Surg June 2021

Copyright © 2021 by the Society for Vascular Surgery®



Males vs. females in elective setting

SYSTEMATIC REVIEW | VOLUME 62, ISSUE 3, P367-378, SEPTEMBER 01, 2021

Editor's Choice – Systematic Review and Meta-Analysis of Sex Specific Differences in Adverse Events After Open and Endovascular Intact Abdominal Aortic Aneurysm Repair: Consistently Worse Outcomes for Women Anna L. Pouncey A C • Michael David • Rachael I. Morris • ... Guy Martin • Colin Bicknell •

Janet T. Powell
Show all authors

Inclusion criteria	Exclusion criteria		
Operation date year 2000 or later	Inclusion of AAA repair before 2000		
Age ≥ 55 y	Studies of selected subgroups, thoracic aortic disease, or syndromic pathologies (e.g., Marfan syndrome)		
Clinical studies of AAA repairs including ≥50 women	Review articles, editorials, case reports, biomarker, pathobiology, and animal studies		
Separate reporting of open repair and endovascular repair	Combined reporting of AAA outcomes (open and endovascular and/or other vascular and/or other surgical outcomes)		
Separate reporting of outcomes from intact AAA cases	Combined reporting of outcomes from intact and ruptured AAA cases		
Studies including patients with infrarenal, juxtarenal, pararenal, or suprarenal AAA	Studies of thoraco-abdominal and isolated iliac aneurysms		





Males vs. females in elective setting

26 studies with 371.215 men vs 65.465 women

Mortality <u>higher in females compared to males</u>
✓ OSR (OR [95% CI] 1.49 [1.37 – 1.61])
✓ EVAR (OR [95% CI] 1.86 [1.59 – 2.17])

SYSTEMATIC REVIEW | VOLUME 62, ISSUE 3, P367-378, SEPTEMBER 01, 2021

Editor's Choice – Systematic Review and Meta-Analysis of Sex Specific Differences in Adverse Events After Open and Endovascular Intact Abdominal Aortic Aneurysm Repair: Consistently Worse Outcomes for Women Anna L. Pouncey $\stackrel{\scriptstyle \wedge}{=}$ • Michael David • Rachael I. Morris • ... Guy Martin • Colin Bicknell Janet T. Powell • Show all authors

Morbidity

- Transfusion
- Pulmonary complications
- Bowel ischemia

more common in women <u>after any repair</u>

- Arterial injury
- Limb ischemia
- Renal and cardiac complications _____

more common in women after EVAR

Males vs. females in urgent setting

Original article

Emergent surgical intervention for ruptured AAA

• 15.717 patients, 83.3% males

No attempted repair for ruptured AAA

• 12.767 patients, 62.0% males

Sex differences in national rates of repair of emergency abdominal aortic aneurysm

A. Aber¹^(b), T. S. Tong¹, J. Chilcott¹, P. Thokala¹, R. Maheswaran¹, S. M. Thomas², S. Nawaz², S. Walters¹ and J. Michaels¹^(b)

<u>Women</u> treated for ruptured AAA presented <u>higher in-hospital mortality</u> 50.0 vs. 41.0% in OSR and 30.9 vs. 23.5% in EVAR

No repair

• <u>2.88 OR</u> for no repair in women vs. men

After adjustment for age, deprivation and co-morbidities

• <u>1.34 OR</u> for no repair in women *vs.* men

Males vs. females in urgent setting

- 10.724 patients with rAAA
- EVAR or OSR (NS difference)
- Higher
 - Percentage of men admitted to hospital (79.8 vs 77.5%; P = .011)
 - Percentage of men treated (56.6 vs 40.4%; P < .001)
 - 30-day mortality in women (P < .001)
 - 1-year mortality in women (P<.001)

Decrease in ruptured AAA incidence, mostly owing to a decrease among men

Sex differences in repair rates and outcomes of patients with ruptured abdominal aortic aneurysm

S. Zommorodi^{1,3}, M. Bottai² and R. Hultgren^{1,4}

	All patients (n = 8498)	Women (n = 2032)	Men (<i>n</i> = 6466)	P ‡
Treated	4480 (52-7)	820 (40-4)	3660 (56.6)	<0.001
Surgical approach				0.740
OSR	3758 (83-9)	691 (84-3)	3067 (83-8)	
EVAR	722 (16-1)	129 (15-7)	593 (16-2)	

Gender impact on AAA repair

- 1.231 patients, 19.6% women, with AAA
- Intact AAA (86.4%)
- Ruptured AAA (13.6%)

Technique

- 79.0% EVAR
- 21.0% OSR

Annals of Vascular Surgery CLINICAL RESEARCH | VOLUME 39, P128-136, FEBRUARY 01, 2017 Influence of Gender on Abdominal Aortic Aneurysm Repair in the Community Daiva Nevidomskyte & 🖾 • Sherene Shalhub • Niten Singh • Ellen Farokhi • Mark H. Meissner

Women experienced

- Worse hospital outcomes in <u>elective EVAR</u> (3.1% vs. 0.6%, P = 0.01), but <u>not in</u> <u>rAAA repair</u>
- Less common EVAR, with <u>significant difference in elective</u> (82.1% vs. 74.1%, P = 0.01), but <u>not in rAAA</u>

Gender impact on AAA repair

Patients with AAA repair from 2003 to 2018 in VQI Stratification by procedure (EVAR vs OSR) 50 213 patients

- <u>Men</u>OSR 73% and EVAR 81%
- ✓ 9263 (19%) OSR
- ✓ 40 950 (82%) EVAR

<u>Females</u>

- ✓ More likely to have **hostile neck** (P < .001)
- 2-fold increase of developing type 1 endoleak
- ✓ 86% and 50% increased risk of 30-day mortality in OSR and EVAR

Higher renal, cardiac, and pulmonary complications, especially after EVAR

Impact of Gender on Outcomes Following Abdominal Aortic Aneurysm Repair

Satinderjit Locham, MD¹, Abdelrahman Shaaban, BSc², Linda Wang, MD³, Dennis Bandyk, MD¹, Marc Schermerhorn, MD⁴, and Mahmoud B. Malas, MD, MHS, FACS¹

Gender impact on AAA repair

Original communication

Gender differences in abdominal aortic aneurysms in Germany using health insurance claims data

Konstanze Stoberock®, Henrik Christian Rieß®, Eike Sebastian Debus, Thea Schwaneberg, Tilo Kölbel, and Christian-Alexander Behrendt

 \mathbf{b}

Health insurance claims data

5.509 patients treated for AAA (intact & ruptured) between October 2008 and April 2015

4.966 intact AAA (84.6% males) -

EVAR or OSR, with median follow-up of 2.44 years

543 ruptured AAA (79.9% males)

<u>Females</u>

Generally older

More likely to be transferred to other hospital or rehab

Slightly higher in-hospital mortality

- Intact AAA repair (2.3 % vs. 3.1 %, p = .159)
- Ruptured AAA repair (37.3 % vs. 43.1 %, p = .273)

Females with AAA managed in elective and urgent setting

• PICO model

Eligible studies	Exclusion criteria
Any observational or randomized controlled trial	Endovascular or OSR for other aortic pathologies
30-day mortality data in female population that underwent AAA repair	Less than 100 patients
Comparing EVAR vs OSR in elective and urgent setting	
Only infra-renal AAA demanding aortic repair using conventional OSR or standard EVAR	

*Symptomatic and ruptured cases were included into the urgent group

PRISMA flow chart



Meta-analysis total cohort

56.982 females

✓ 22.995 EVAR vs. 33.987 OSR

✓ Mean age of the patients was 76 years (range 73-76.5 years)

✓ Mean AAA diameter at 58mm (range 55-65mm)

✓ Patients that needed urgent repair were older and had larger aneurysm diameter compared to the elective cases (78.5 vs. 75 years, and 69 vs. 56mm)

<u>30-day mortality comparing EVAR vs. OSR</u>

- Mortality 2.80% in EVAR vs. 12.05% in OSR
- reduced 30-day mortality rate in females who underwent EVAR compared to OSR (OR, 0.25; 95% CI, 0.23-0.27; P<.001, Chi² test, P< .001; I²=86%)



30-day mortality in EVAR vs. OSR in elective setting

51.388 patients

22.372 EVAR vs. 29.016 OSR

- Mortality <u>2.13% in EVAR</u> vs. <u>6.56% in OSR</u>
- significant reduction in 30-day mortality in EVAR compared to OSR (OR, 0.34; 95% CI, 0.31-0.38; P< .001, P< .001, I²=48%)



<u>30-day mortality in EVAR vs OSR in urgent</u> <u>setting</u>

Application of EVAR vs OSR in urgent setting

Significantly less likely to undergo EVAR (OR, 0.21; 95% CI, 0.19-0.23; P< .001, I²=84%)

<u>30-day mortality comparing EVAR vs OSR in urgent setting</u>

5.594 females

625 EVAR vs 4.969 OSR

- <u>26.88% in EVAR vs. 44.09% in OSR</u>
- significant lower 30-day mortality in urgent EVAR compared to OSR (OR, 0.48; 95% CI, 0.40-0.57; P<.001, Chi² test, P value=0.99, I²=0%)



Gender specific studies for AAA

- No RCT for the female population
- <u>Despite that</u>

✓ Higher risk of AAA rupture

✓ Rupture at smaller diameters

✓ More complex AAA anatomy

✓ Socioeconomic factors

Conclusions

 EVAR is associated with a clear benefit in mortality outcomes in both elective and urgent settings in females

EVAR is associated with worse outcomes in females compared to males

EVAR is less likely to be offered in females in urgent setting

✓ There might be a need for low-profile endografts with characteristics that are more specific in females

Thank you



