

# Women in vascular surgery

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EVST UEMS representative  
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**70th ESCVS**  
International congress of the European Society  
for Cardiovascular and Endovascular Surgery



**7th IMAD meeting**

# Outcome for women after AAA repair

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# AAA in women

- Best medical treatment
- Prevalence of AAA
- Screening of AAA
- Threshold for treatment
- Outcome after EVAR or open repair
- EVAR & IFU



# Best medical treatment in women

Journal of the American Heart Association

## **SYSTEMATIC REVIEW AND META-ANALYSIS**

### Sex Differences in Cardiovascular Medication Prescription in Primary Care: A Systematic Review and Meta-Analysis

	MEN	WOMEN
Aspirin	56%	41%
Statins	63%	60%
Antihypertensive med	69%	68%

**CONCLUSIONS:** Sex differences in the prescription of cardiovascular medication exist among patients at high risk or with established cardiovascular disease in primary care, with a lower prevalence of aspirin, statins, and angiotensin-converting enzyme inhibitors prescription in women and a lower prevalence of diuretics prescription in men.



# AAA prevalence men/women 4/1

kenmerk	DREAM (n = 351)		OVER (n = 881)		EVAR-1 (n = 1252)	
inclusieperiode	2000-2003		2002-2008		1999-2003	
follow-upduur in jaren; gemiddelde	6,4		5,2		6,0	
behandeling	EVAR (n = 173)	open (n = 178)	EVAR (n = 444)	open (n = 437)	EVAR (n = 626)	open (n = 626)
volledige follow-up: %	99,7	99,3	99	99	99	99
♂	161 (93,1)	161 (90,4)	441 (99,3)	435 (99,5)	565 (90,3)	570 (91,1)
leeftijd in jaren; gemiddelde	70,7	69,6	69,9	70,5	74,1	74,0
aneurysmadiameter in cm; gemiddelde	6,0	6,0	5,7	5,7	6,4	6,5
nu of ooit gerookt	111 (64,2)†	98 (55,1)†	428 (96,4)	413 (94,5)	553 (88,5)	580 (92,8)
cardiaal belast	71 (41)	83 (46,6)	174 (39,2)	185 (42,3)	269 (43)	261 (41,8)
BMI in kg/m <sup>2</sup> ; gemiddelde	26,3	26,6	28,6	28,7	26,5	26,5
gebruikt betablokker	76 (43,9)	92 (51,7)	282 (63,5)	282 (64,5)	NR	NR
gebruikt statine	63 (37,7)	72 (41,9)	NR	NR	216 (34,9)	224 (36,0)
gebruikt trombocytenaggregatieremmer	70 (40,5)	72 (40,4)	244 (55,0)	277 (63,4)	338 (54,0)	325 (51,9)

20% ?



# AAA screening



Recommendation 12	Class	Level	References
Population screening for abdominal aortic aneurysm with a single ultrasound scan for all men at age 65 years is recommended.	I	A	[132,390,408, 410,495,509, 614,690,691, 758]

Recommendation 14	Class	Level	References
Population screening for abdominal aortic aneurysm in women is not recommended.	III	B	[395,613,671, 672]

Recommendation 15	Class	Level	References
All men and women aged 65 years and older with a first degree relative with an abdominal aortic aneurysm should be considered for abdominal ultrasound screening at 5-year intervals.	IIb	C	[7,380,743]
We recommend a one-time ultrasound screening for AAAs in men or women 65 to 75 years of age with a history of tobacco use.			
Recommendation 16	Level of recommendation		1 (Strong)
Screening for abdominal aortic aneurysm in men and women 65 to 75 years of age with a history of tobacco use may be considered for true peripheral arterial aneurysm.	Quality of evidence		A (High)
			References [71]

**SVS**





# AAA threshold for repair in women

- In relationship to body surface area
- Aortic index: ratio normal infrarenal

## A registry-based rationale for discrete intervention thresholds for open and endovascular elective aortic aneurysm repair in female patients

Stephanie M. Tomee, BS,<sup>a</sup> Niki Lijftogt, MD,<sup>a</sup> Anco Vahl, MD, PhD,<sup>b</sup> Jaap F. H. Jan H. N. Lindeman, MD, PhD,<sup>a</sup> *Leiden and Amsterdam, The Netherlands*

We recommend elective repair for the patient at low or acceptable surgical risk with a fusiform AAA that is $\geq 5.5$ cm.	
Level of recommendation	1 (Strong)
Quality of evidence	A (High)
We suggest elective repair for the patient who presents with a saccular aneurysm.	
Level of recommendation	2 (Weak)
Quality of evidence	C (Low)
We suggest repair in women with AAA between 5.0 cm and 5.4 cm in maximum diameter.	
Level of recommendation	2 (Weak)

- Lower threshold = higher suitability & higher survival at younger age



# Outcome after AAA repair in women

Morphological suitability for endovascular repair,  
non-intervention rates, and operative mortality in women  
and men assessed for intact abdominal aortic aneurysm  
repair: systematic reviews with meta-analysis

2017

*Pinar Ulug, Michael J Sweeting, Regula S von Allmen, Simon G Thompson, Janet T Powell, on behalf of the SWAN collaborators\**

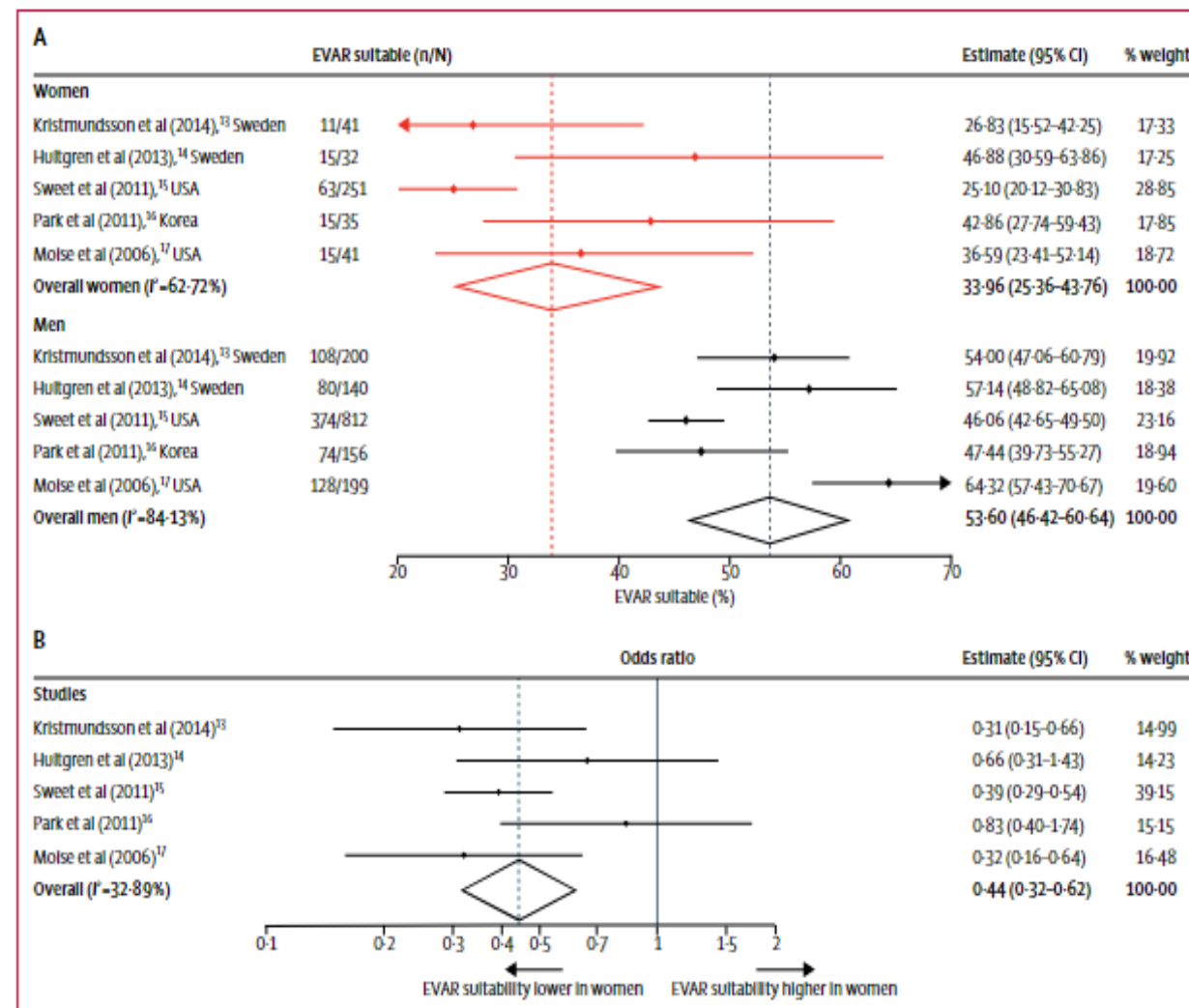
THE LANCET





# EVAR suitability

- 34% women  
**OR 0,44 (95% CI 0,32 - 0,62)**
- 54% men
- Morphological criteria
  - ✓ neck length  
15mm to >7,5mm from 25% to 45%
  - ✓ iliac diameter  
7,5- 8mm to 6mm from 27% to 39%
  - ✓ aneurysm diameter  
>65mm no women suitable  
>65mm 30% men suitable



**Figure 1:** Forest plots of the proportion of aneurysm patients morphologically suitable for EVAR  
(A) Women and men separately. (B) Women versus men. EVAR=endovascular repair.



# EVAR instructions for use

- Women have increased juxtarenal angulation
- Women have smaller iliac arteries

**TABLE 1. INSTRUCTIONS FOR USE FOR THREE ENDOVASCULAR GRAFT MANUFACTURERS**

## **Limb Graft Occlusion Following Endovascular Aneurysm Repair for Infrarenal Abdominal Aortic Aneurysm with the Zenith Alpha, Excluder, and Endurant Devices: a Multicentre Cohort Study**

Marko Bogdanovic <sup>a</sup>, Otto Stackelberg <sup>b,c</sup>, David Lindström <sup>d</sup>, Samuel Ersryd <sup>d,e</sup>, Manne Andersson <sup>f,g</sup>, Håkan Roos <sup>h,i</sup>, Antti Siika <sup>a</sup>, Magnus Jonsson <sup>a,i</sup>, Joy Roy <sup>a,i,\*</sup>

<sup>a</sup>Gore & Associates; <sup>b</sup>Cook Medical; <sup>c</sup>Medtronic, Inc.



# Non-intervention

- 34% women

**OR 2,27 (95% CI 1,21 - 4,23)**

- 19% men

- Non-intervention after 3 years

- only 1/3 alive
- 37% died of rupture

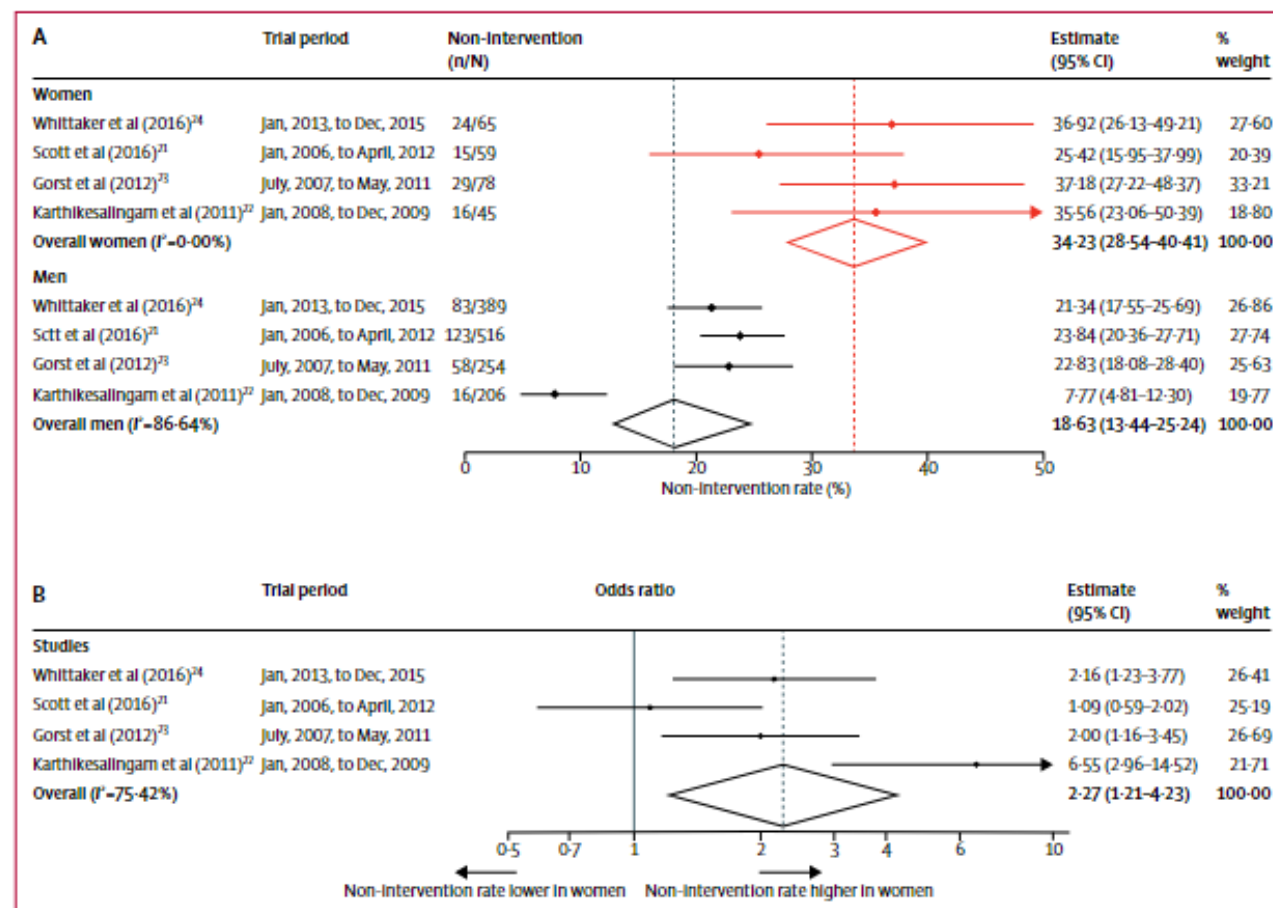


Figure 2: Forest plots of non-intervention rates in cohorts of patients assessed for intact abdominal aortic aneurysm repair (A) Women and men separately. (B) Women versus men.





# 30-day mortality EVAR

- 2.31% women

**OR 1.67 (95% CI 1.38–2.04)**

- 1.37% men

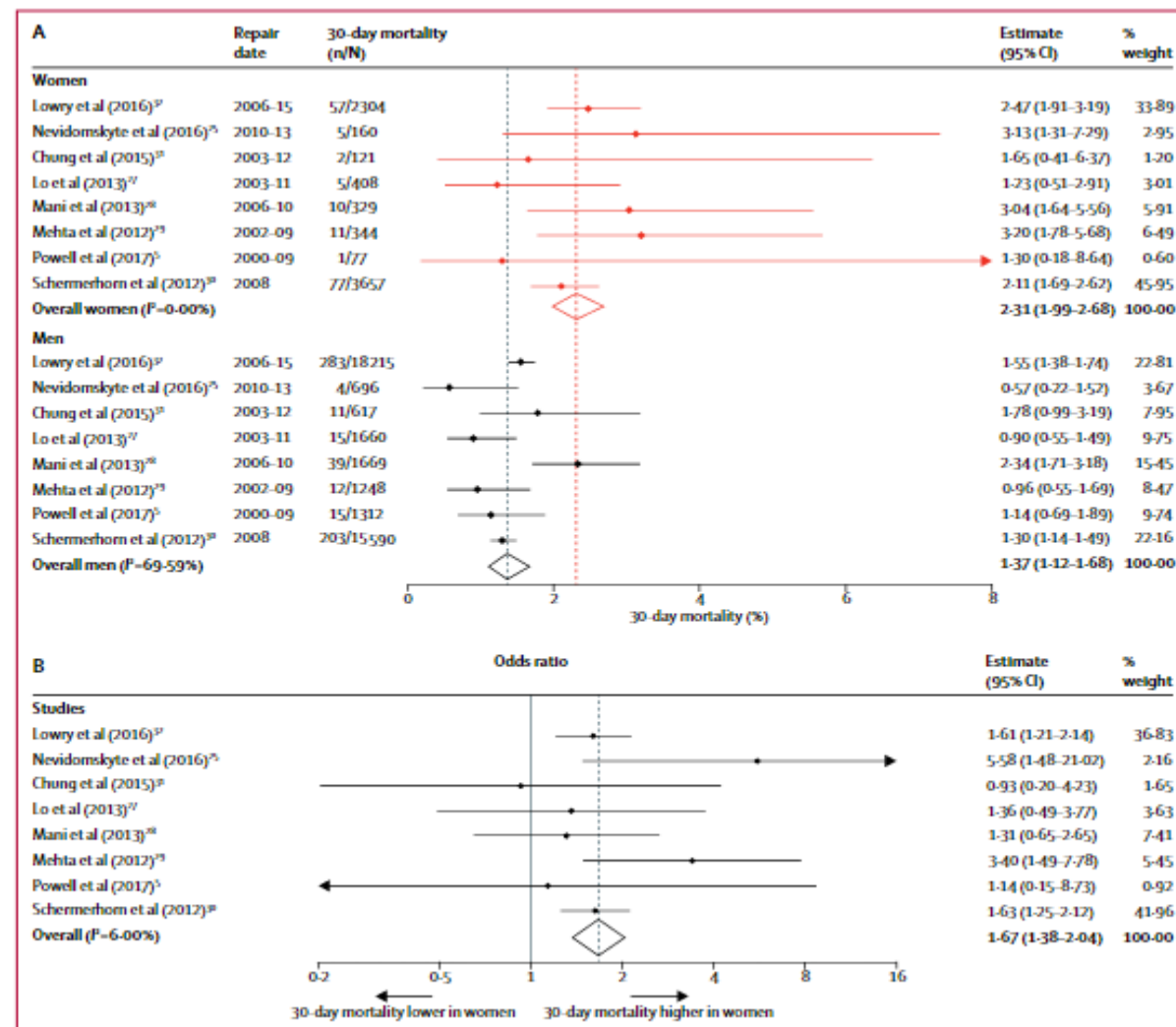


Figure 3: Forest plots of 30-day mortality after EVAR for intact abdominal aortic aneurysm (A) Women and men separately. (B) Women versus men. EVAR=endovascular repair.

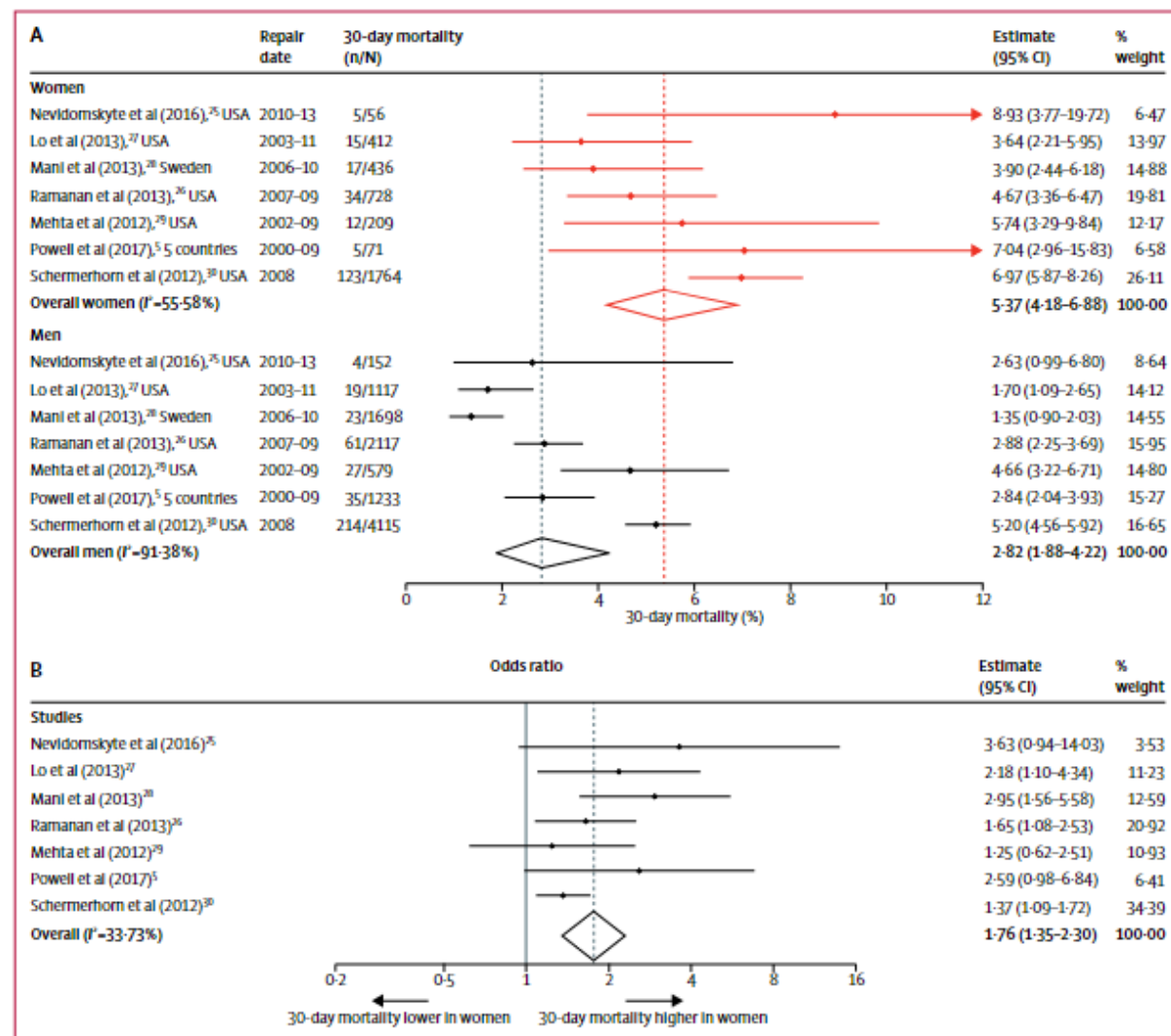


## 30-day mortality open repair

- 5.37% women

**OR 1.76 (1.35–2.30)**

- 2.82% men

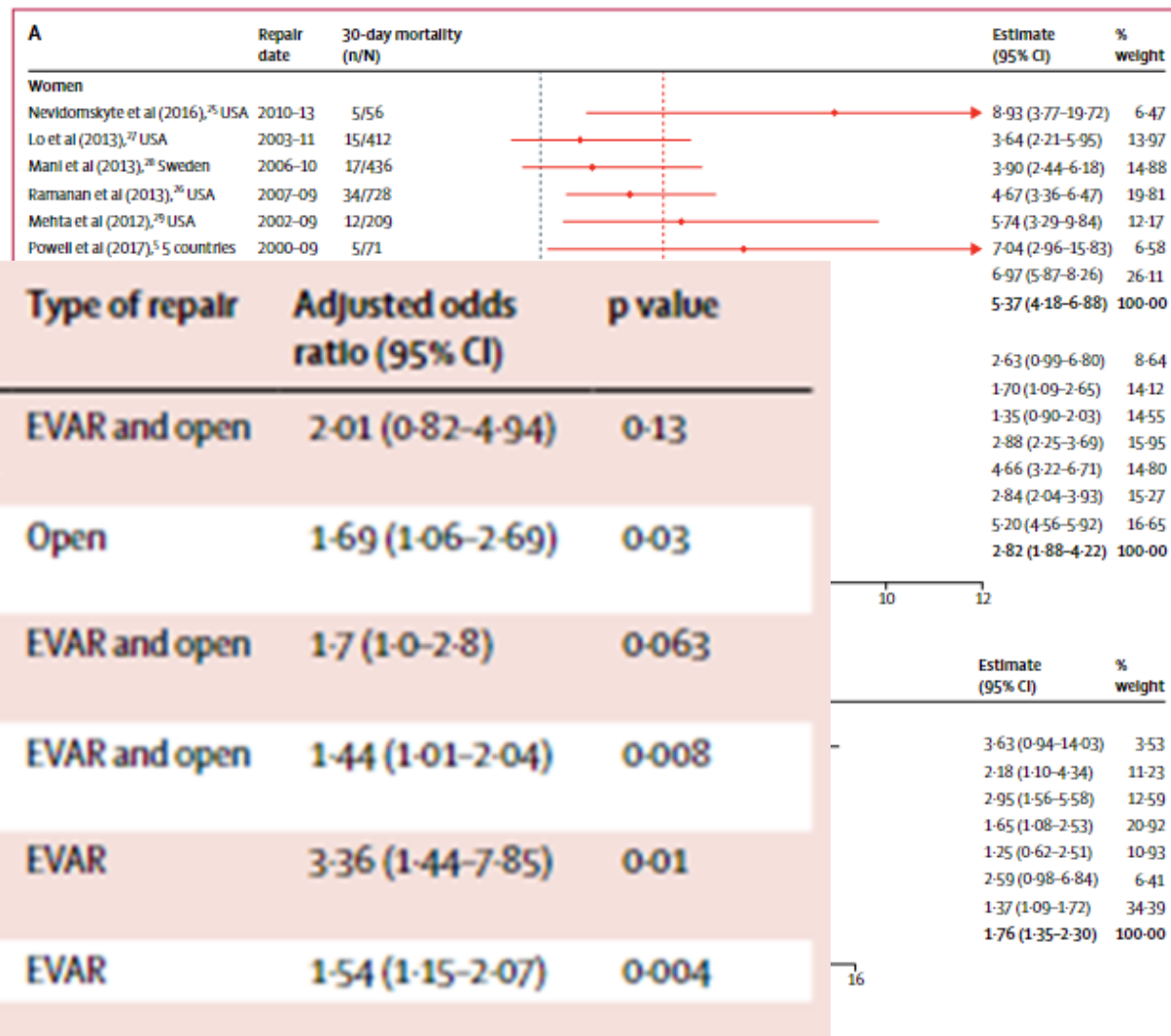


**Figure 4:** Forest plots of 30-day mortality after open repair for intact abdominal aortic aneurysm (A) Women and men separately. (B) Women versus men.



# 30-day mortality open repair

- 5.37% v
- OR
- 2.82% r







# Systematic review and meta-analysis of sex differences in outcomes after endovascular aneurysm repair for infrarenal abdominal aortic aneurysm

Yang Liu, MD,<sup>a,b</sup> Yi Yang, MD,<sup>a</sup> Jichun Zhao, MD,<sup>a</sup> Xiyang Chen, Bin Huang, MD,<sup>a</sup> Ding Yuan, MD,<sup>a</sup> and Xiaojiong Du, MD,<sup>a</sup> Cheng

Outcomes	No. of cohorts	Effect measure	Effect estimate	95% CI	P value	I <sup>2</sup> (Q), %
Short-term outcomes						
30-day mortality						
Overall	22	OR	1.67	1.50-1.87	<.001	0
Intact	13	OR	1.7	1.44-2.02	<.001	12.9
Ruptured	5	OR	1.57	1.24-1.99	<.001	0
Indeterminate	4	OR	2.55	0.61-10.69	.199	19.4
Adjusted	5	OR	1.73	1.32-2.26	<.001	54
In-hospital mortality						
Overall	10	OR	1.9	1.43-2.53	<.001	46.4
Intact	7	OR	2.1	1.79-2.48	<.001	0
Ruptured	3	OR	0.93	0.38-2.28	.88	62.8
Limb ischemia						
Overall	9	OR	2.44	1.73-3.43	<.001	0
Intact	6	OR	2.48	1.60-3.84	<.001	16.2
Visceral/mesenteric ischemia						
Overall	8	OR	1.62	0.91-2.88	.098	0
Intact	6	OR	1.85	1.01-3.39	.046	0
Renal complications						
Overall	8	OR	1.73	1.12-2.67	.028	0
Intact	5	OR	1.66	1.05-2.61	.013	0
Cardiac complications						
Overall	8	OR	1.68	1.01-2.80	.046	25.3
Intact	6	OR	1.64	0.85-3.17	.138	45.2
30-day reinterventions						
Overall	6	OR	1.37	0.95-1.98	.095	59.8
Intact	5	OR	1.59	0.89-2.83	.116	66.5



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Bin Huang, MD,<sup>a</sup> Ding Yuan, MD,<sup>a</sup> and Xiaojiong Du, MD,<sup>a</sup> *Chengdu, China*

Long-term outcomes						
Long-term all-cause mortality						
Overall	10	HR	1.23	1.09-1.38	<b>.001</b>	53.7
Intact	8	HR	1.21	1.06-1.39	<b>.006</b>	50.9
Ruptured	2	HR	1.32	1.13-1.55	<b>.001</b>	0
Late endoleaks						
Overall	8	OR	1.18	0.88-1.56	.264	57.2
Intact	6	OR	1.21	0.88-1.66	.241	65.2
Late reinterventions						
Overall	10	OR	1.05	0.78-1.41	.741	64.4
Intact	9	OR	1.12	0.86-1.47	.388	58.3



# Women at time of AAA repair

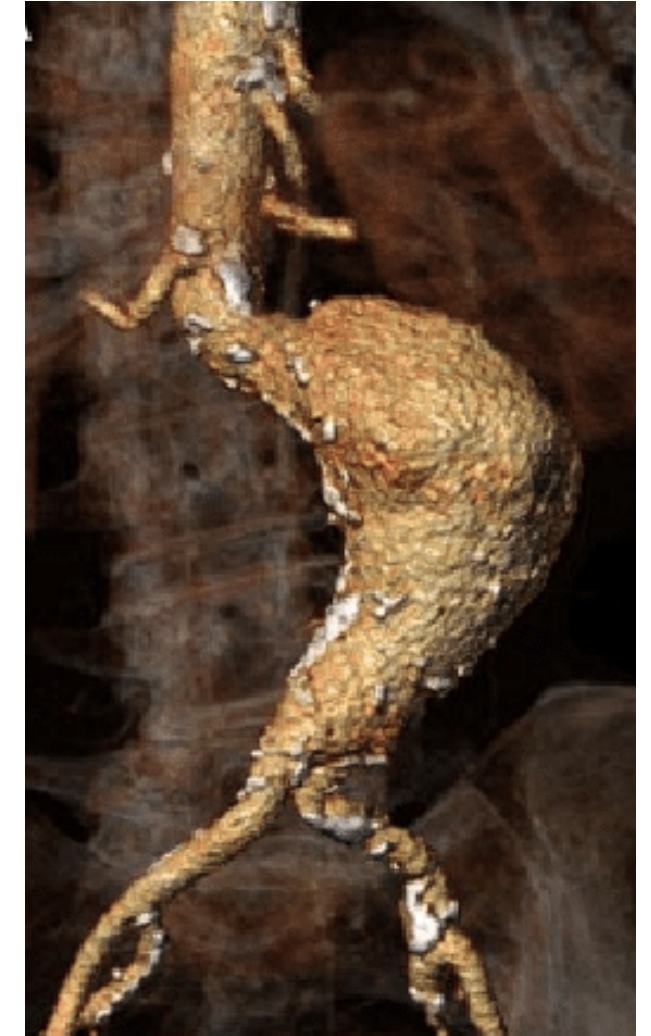
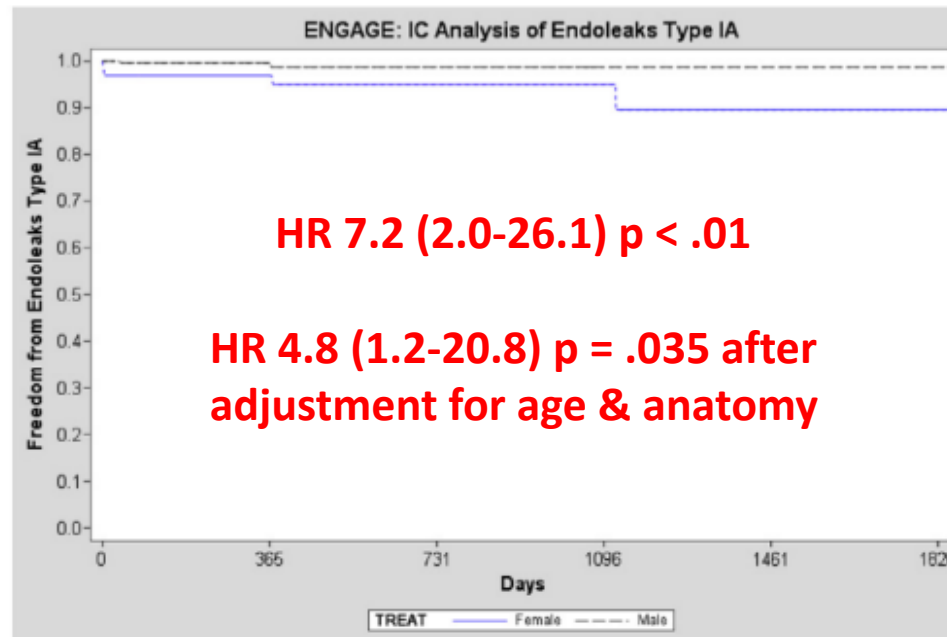
- Average aortic diameter -2mm for women versus men  
= relatively larger growth to reach 55mm
- 4x higher rupture risk & at smaller diameters
- Older at time of repair





# Women at time of AAA repair

- Small access vessels
- Angulated infrarenal neck





# CONCLUSION

- BMT is worse in women
- Low % female patients in EVAR trials
- Screening of female (ex)-smokers ?
- Lower threshold for treatment ?
- Less suitable for EVAR
- High non-intervention rate
- Higher morbidity & mortality

... comparable findings in PAD, carotid disease, TAAA



**70<sup>TH</sup> ESCVS  
CONGRESS & 7<sup>TH</sup>  
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