Эндоваскулярная хирургия аневризм брюшной и грудной аорты. Update 2021.

С. А. Абугов

Обсуждаются только больные с благоприятной анатомией

European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms

Anders Wanhainen [a,†,*], Fabio Verzini [a,†], Isabelle Van Herzeele [a], Eric Allaire [a], Matthew Bown [a], Tina Cohnert [a], Florian Dick [a], Joost van Herwaarden [a], Christos Karkos [a], Mark Koelemay [a], Tilo Kölbel [a], Ian Loftus [a], Kevin Mani [a], Germano Melissano [a], Janet Powell [a], Zoltán Szeberin [a]

ESVS Guidelines Committee [b], Gert J. de Borst, Nabil Chakfe, Sebastian Debus, Rob Hinchliffe, Stavros Kakkos, Igor Koncar, Philippe Kolh, Jes Lindholdt, Melina de Vega, Frank Vermassen

Document reviewers [c], Martin Björck, Stephen Cheng, Ronald Dalman, Lazar Davidovic, Konstantinos Donas, Jonothan Earnshaw, Hans-Henning Eckstein, Jonathan Golledge, Stephan Haulon, Tara Mastracci, Ross Naylor, Jean-Baptiste Ricco, Hence Verhagen

Аневризмы брюшной аорты

Рекомендации по АБА

- Скрининг всех мужчин старше 65 лет

Recommendation 12	Class	Level
Population screening for abdominal aortic aneurysm with a single ultrasound scan for all men at age 65 years is recommended.	I	A

Рекомендации по АБА

- При диаметре аорты 2.5 – 2.9 см скрининг через 5-10 лет

Recommendation 13	Class	Level
Men with an aorta 2.5—2.9 cm in diameter at initial screening may be considered for rescreening after 5—10 years.	IIb	C

Рекомендации по АБА

- УЗИ каждые 3 года при диамере 3-3.9 см
- Ежегодно при диаметре 4.0-4.9 см
- Через каждые 3-6 месяцев при диаметре больше 5.0 см

Recommendation 17	Class	Level
Ultrasonography is recommended for aneurysm surveillance; every three years for aneurysms 3—3.9 cm in diameter, annually for aneurysms 4.0—4.9 cm, and every 3—6 month for aneurysms ≥5.0 cm.	I	B

Рекомендации по АБА

- Не существует специфической медикаментозной терапии

Recommendation 19	Class
No specific medical therapy has been proven to slow the expansion rate of an abdominal aortic aneurysm, and therefore is not recommended.	III

Рекомендации по АБА

- Критерий принятия решения: 5.5 см для мужчин и 5.0 см для женщин

Recommendation 22	Class
In men, the threshold for considering elective abdominal aortic aneurysm repair is recommended to be ≥5.5 cm diameter.	I

Recommendation 23	Class
In women with acceptable surgical risk the threshold for considering elective abdominal aortic aneurysm repair may be considered to be ≥5.0 cm diameter.	IIb

Рекомендации по АБА

- Рутинное кардиологическое обследование перед операцией не рекомендуется!!!

Recommendation 27	Class	Level
Routine referral for cardiac work up, coronary angiography and cardiopulmonary exercise testing is not recommended prior to abdominal aortic aneurysm repair.	III	C

Рекомендации по АБА

- Кардиологическое обследование рекомендуется больным с индексом Дюка менее 4 или с существенными клиническими факторами риска.

Recommendation 28	Class	Level
In patients with poor functional capacity (defined as $\leq$ 4 metabolic equivalents) or with significant clinical risk factors (such as unstable angina, decompensated heart failure, severe valvular disease, and significant arrhythmia), referral for cardiac work up and optimisation is recommended prior to elective abdominal aortic aneurysm repair.	I	C

Рекомендации по АБА

- У больных со стабильной стенокардией, профилактическая реваскуляризация миокарда не рекомендуется. Это касается и б-х с ФВ<35%, стенозом ствола и 3-х сосудистым поражением

Recommendation 29	Class	Level	References
In patients with stable coronary artery disease, routine coronary revascularisation before elective abdominal aortic aneurysm repair is not recommended.	III	B	[206,360,461]

gery,[461] even considering those with left main stem and triple vessel disease, or those with a left ventricular ejection fraction below 35%. Therefore, pre-operative coronary

Рекомендации по АБА

- Рутинный скрининг сонных артерий у асимптомных больных не рекомендуется
- Профилактические операции на сонных артериях у асимптомных больных не рекомендуются

Recommendation 40	Class	Level
Routine screening for asymptomatic carotid stenosis prior to abdominal aortic aneurysm repair is not recommended.	III	C

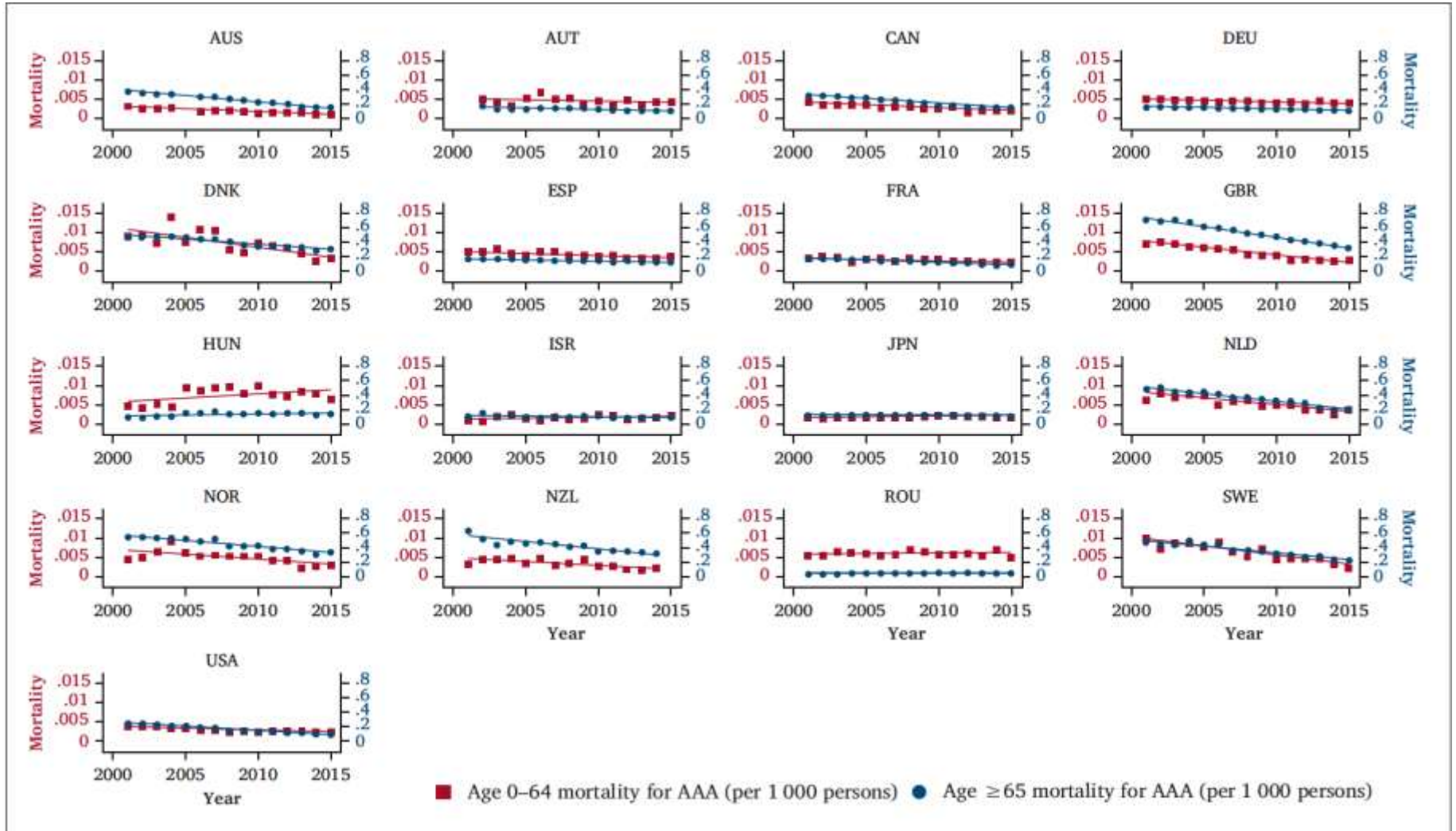
Recommendation 42	Class	Level
Routine prophylactic carotid intervention for asymptomatic carotid stenosis prior to abdominal aortic aneurysm repair is not recommended.	III	C

Decrease in Mortality from Abdominal Aortic Aneurysms (2001 to 2015): Is it Decreasing Even Faster?

C.Y. Maximilian Png [a], Jingting Wu [b], Tjun Y. Tang [c], Ivan P.L. Png [d], Tay J. Sheng [b], Edward Choke [b,*]

[a] Massachusetts General Hospital, Department of Surgery, Division of Vascular Surgery, Boston, MA, USA
[b] Sengkang General Hospital, Vascular and Endovascular Service, Singapore
[c] Singapore General Hospital, Outram Road, Singapore
[d] NUS Business School, National University of Singapore, Singapore

Летальность у боьных с АБА 2001-2015



Динамика летальность и модификация факторов риска

Table 1. Rate of mortality and positive, statistically significant risk factor change over time in males with abdominal aortic aneurysm

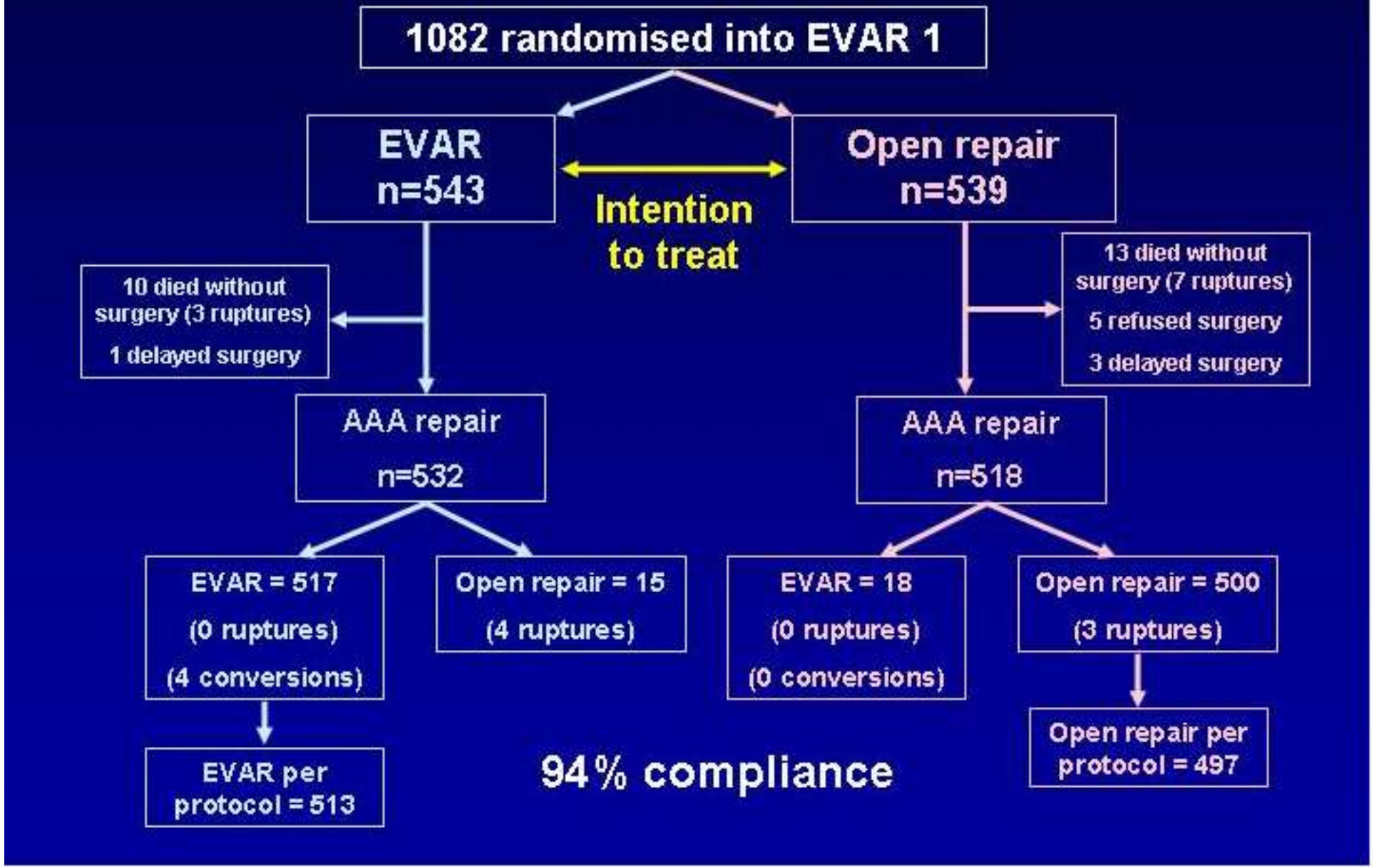
	Time period		
	2001–2005	2006–2010	2011–2015
Mortality	−0.13	−2.39	−3.42
Smoking	−2.27	−2.33	−1.44
Hypertension	−2.20	−2.41	−2.36

Table 2. Rate of mortality and positive, statistically significant risk factor change over time in females with abdominal aortic aneurysm

	Time period		
	2001–2005	2006–2010	2006–2010
Mortality	−0.38	−0.70	−2.61
Smoking	−1.94	−2.17	−1.18
Hypertension	−1.64	−1.90	−2.01

EVAR 1.0 ☺

EVAR Trial 1 : CONSORT diagram

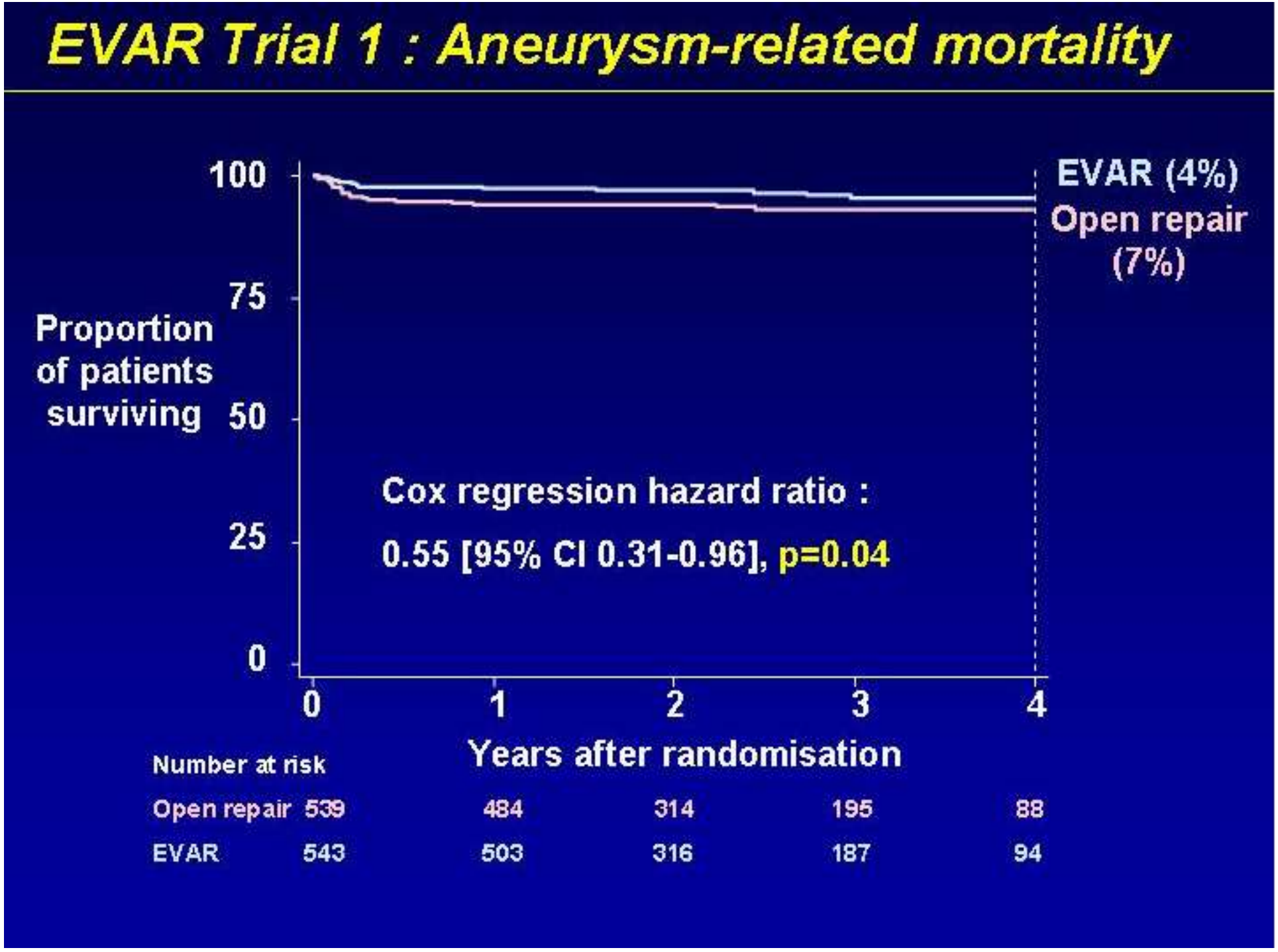


EVAR Trial 1 : Operative mortality

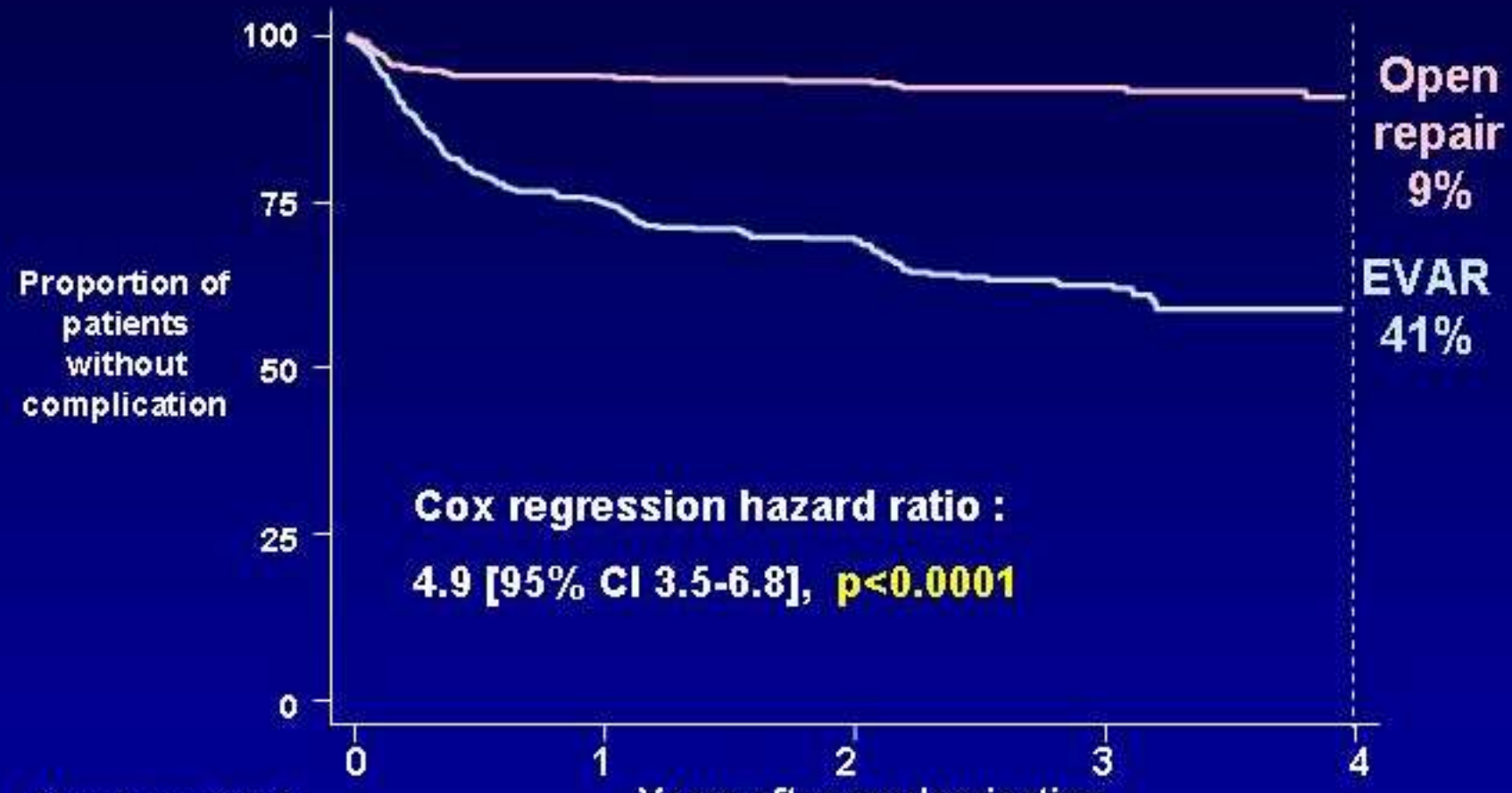
	EVAR	Open repair	Crude hazard ratio [95% CI] (p-value)
30-day mortality	9/532 (1.7%)	25/518 (4.8%)	0.35 [0.16-0.77] p=0.009
In-hospital mortality	10/532 (1.9%)	33/518 (6.4%)	0.32 [0.16-0.64] p=0.001

By randomised group for those who received an operation
Analyses using logistic regression

EVAR Trial 1 : Aneurysm-related mortality

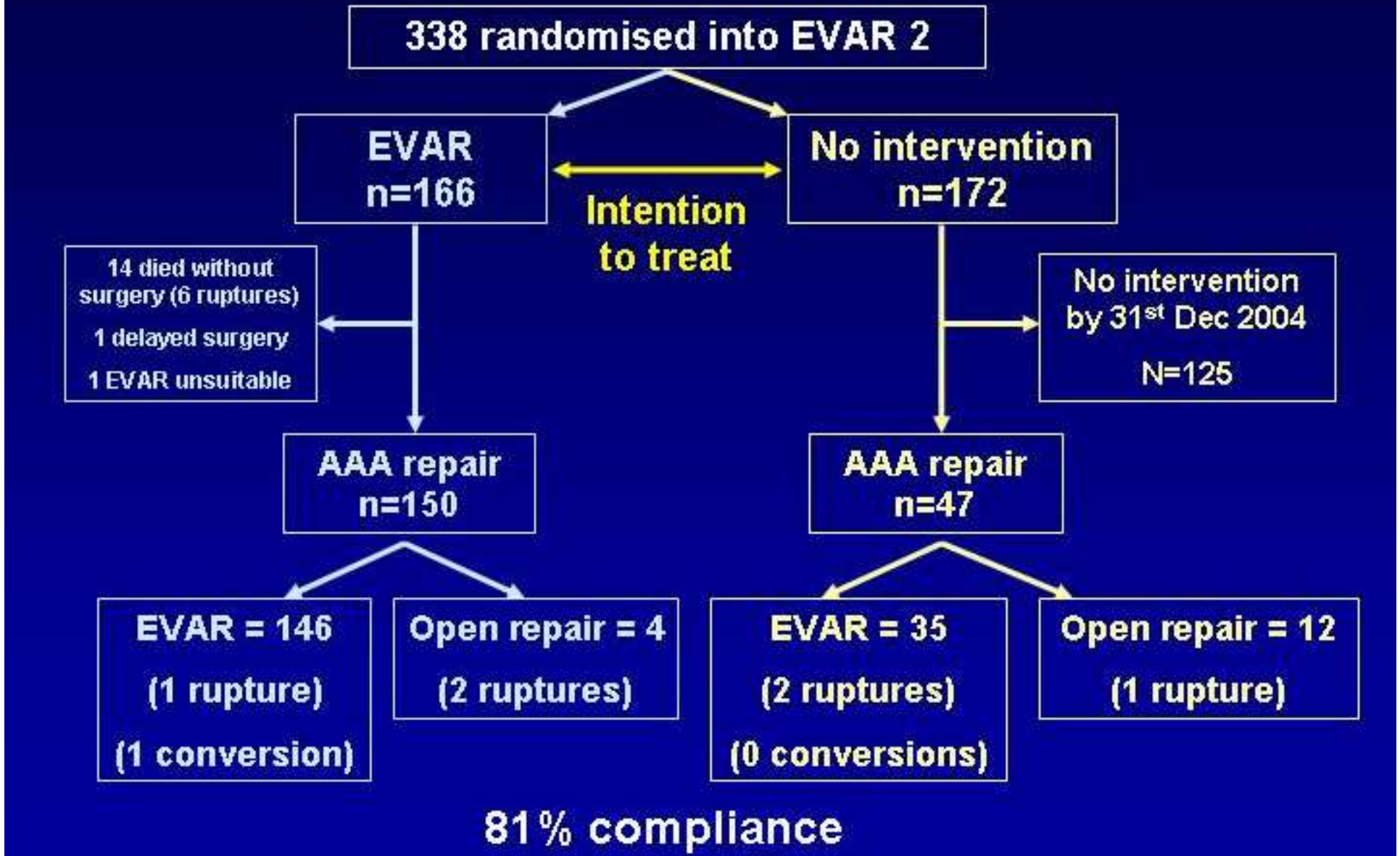


EVAR Trial 1 : Time to first complication

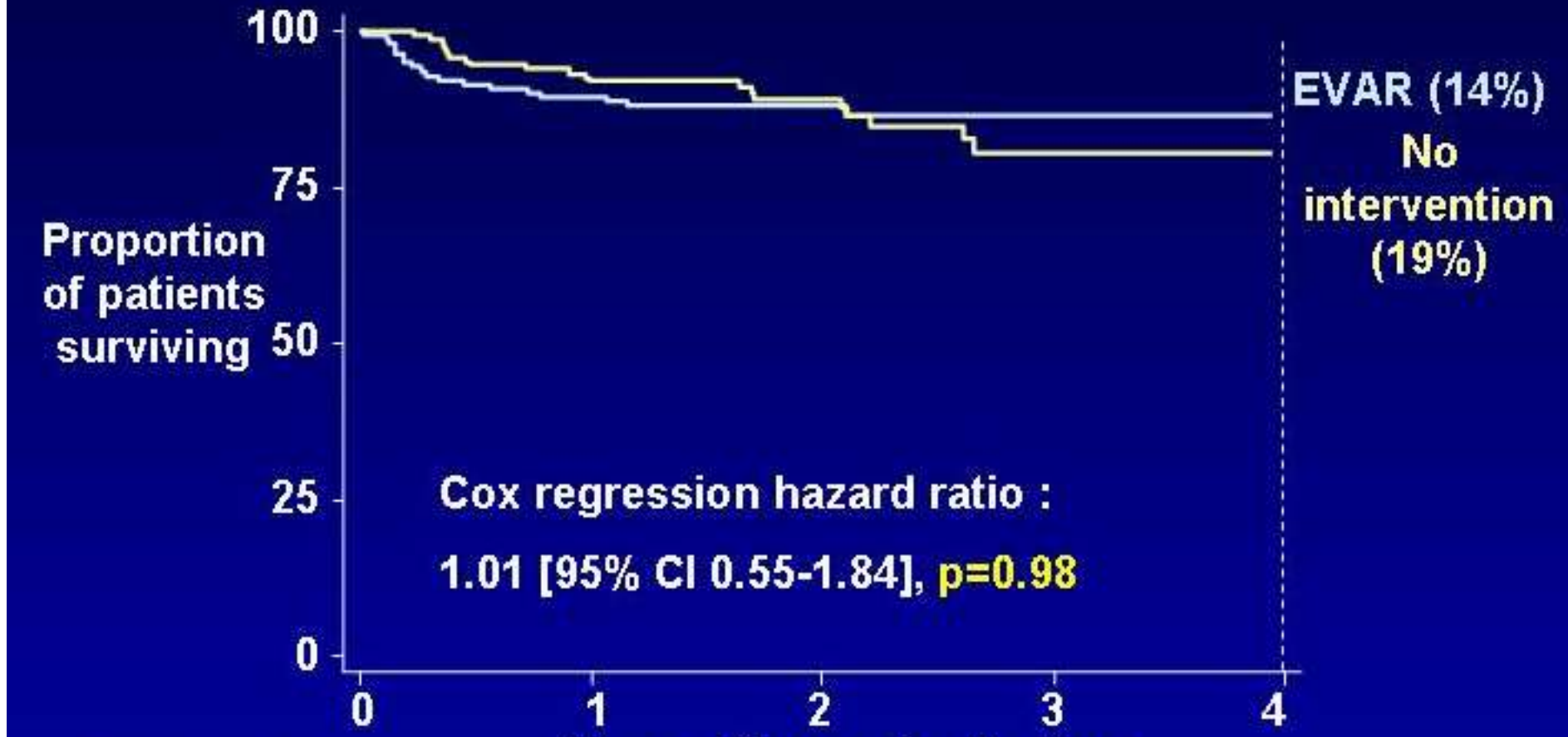


Number at risk					
Open repair	539	466	301	182	82
EVAR	543	386	235	134	67

EVAR Trial 2 : CONSORT diagram

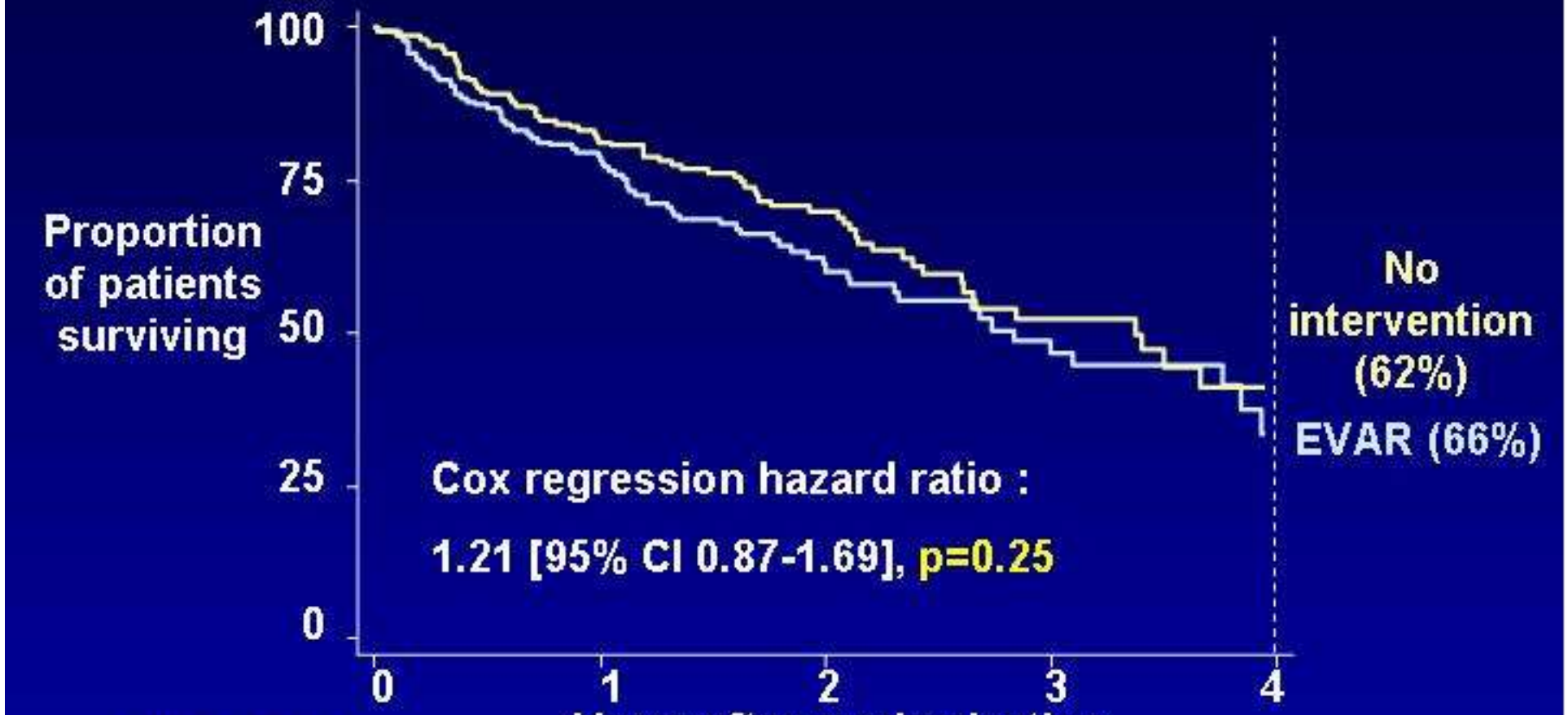


EVAR Trial 2 : Aneurysm-related mortality



Number at risk					
No intervention	172	139	71	29	9
EVAR	166	129	58	23	6

EVAR Trial 2 : All-cause mortality

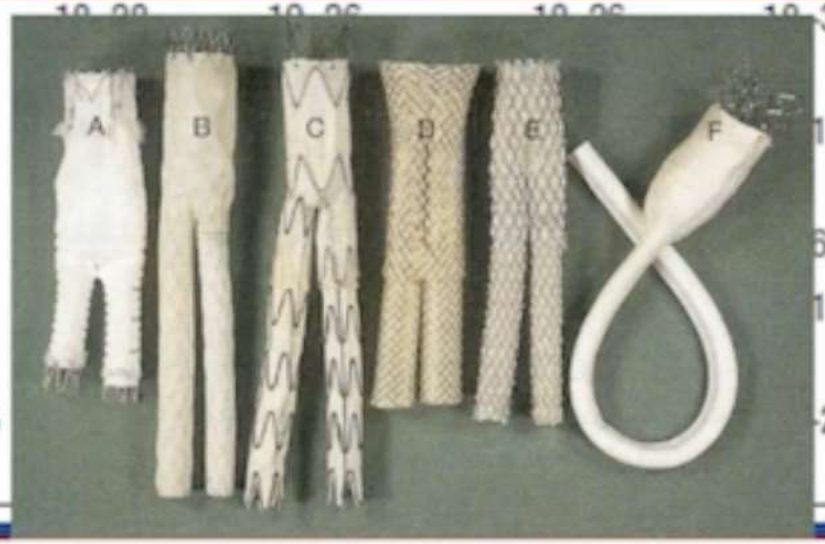


Number at risk					
No intervention	172	139	71	29	9
EVAR	166	129	58	23	6

Эндографты первого/второго поколения

Table 1. Anatomic Criteria as Presented in the Instructions for Use for Abdominal Aortic Aneurysm Endovascular Devices Approved by the US Food and Drug Administration

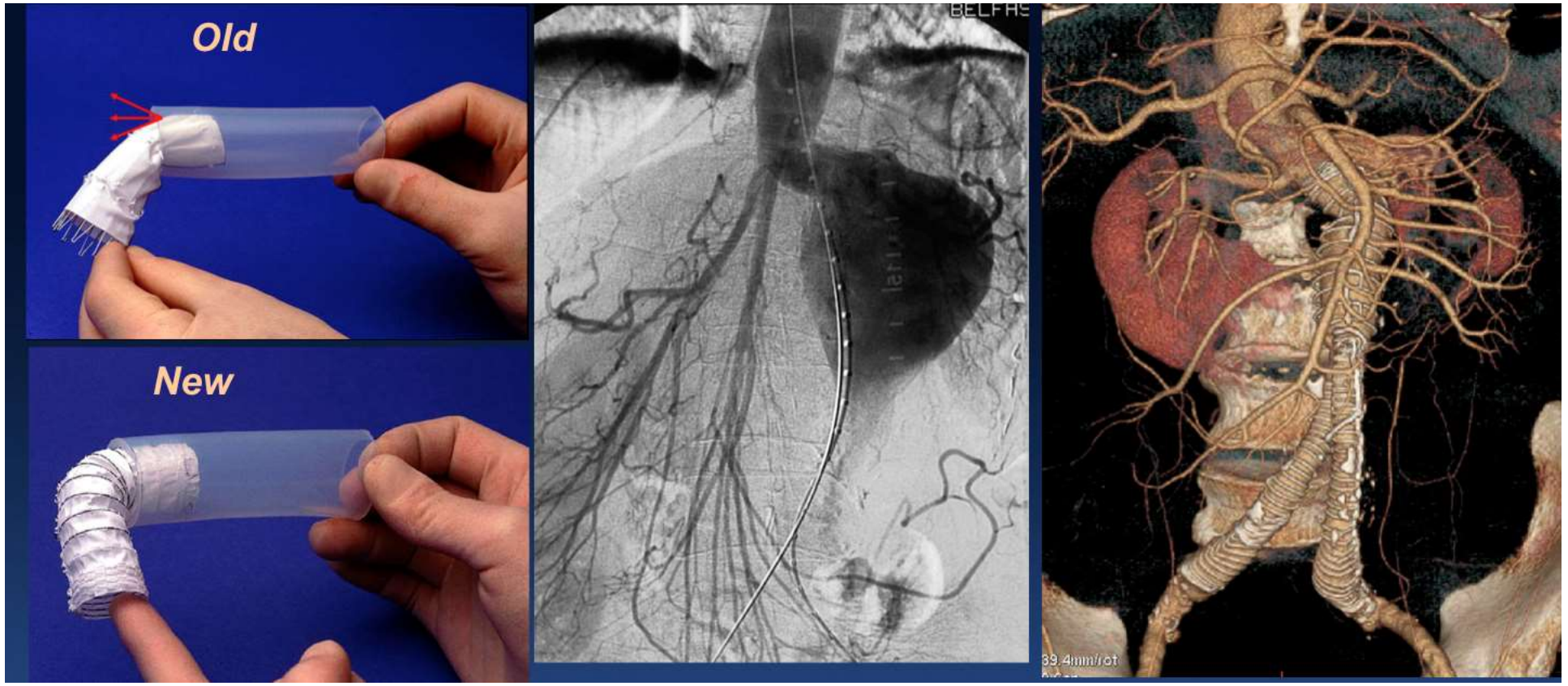
	Guidant Ancure	Medtronic AneuRX	Gore Excluder	Cook Zenith	Gore Excluder Low Permeability	Endologix Powerlink	Cook Zenith Enlarged Neck	Medtronic Talent	Endologix Enlarged Neck	Gore Excluder Enlarged Neck
Year of release	1999	1999	2002	2003	2004	2004	2006	2008	2009	2009
Neck diameter, mm	18–26	18–25	19–26				32	18–32	18–32	19–29
Neck length mm	≥15	≥10*	≥15				15	≥10	≥15	≥15
Neck angle, °	NS	≤45	≤60				60	≤60	≤60	≤60
Iliac fixation length, mm	≥20	NS	≥10				15	≥15	≥15	≥10
Iliac diameter, mm	<13.5	NS	10–18.5				20	8–22	10–23	10–18.5



First and second generation devices >> off the market

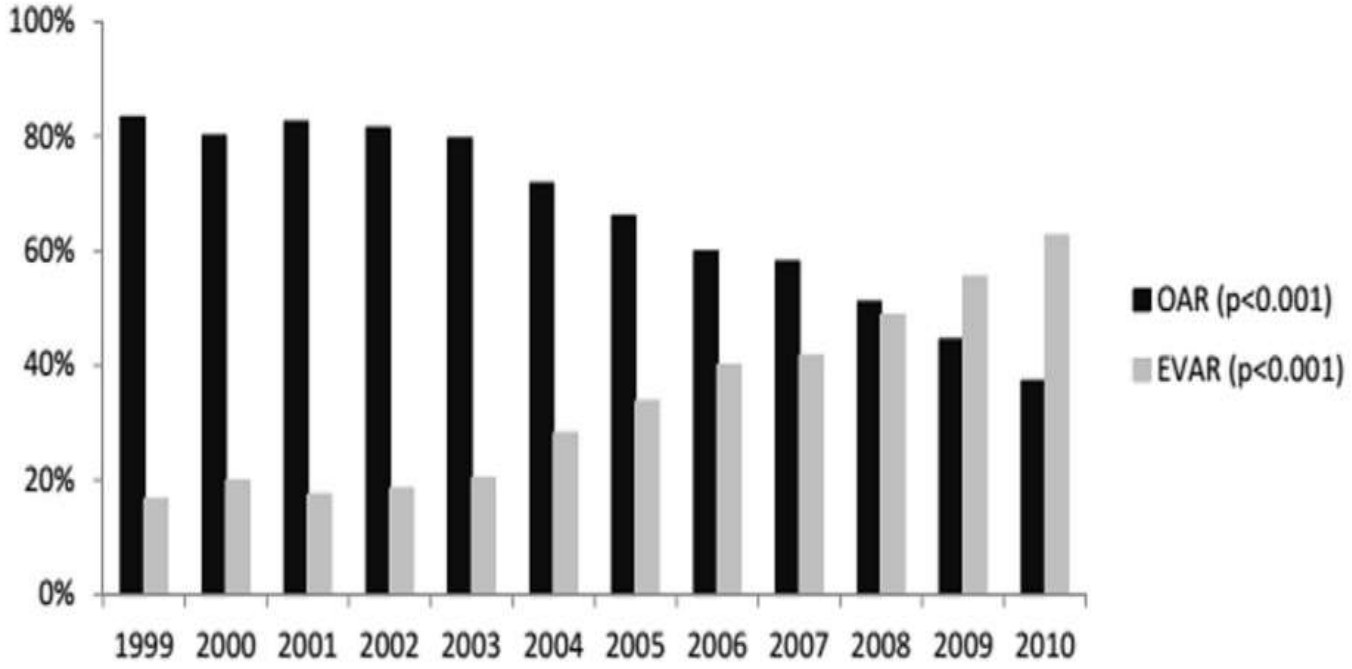
Современные графты

Устойчивость к сгибанию



Тенденции в лечение АБА

Германский регистр по АБА,
36,594 протезирований.
ЭПБА: 16.7% в 1999г до 62.7% в 2010г



Trenner M et al. German Registry Data on 36,594 Procedures. Eur J Vasc Endovasc Surg. 2017 May;53(5):641-647

Риск летальности при открытой хирургии = 8.14-13.2%
VQI perioperative mortality risk score

EVAR 2.0 ☺

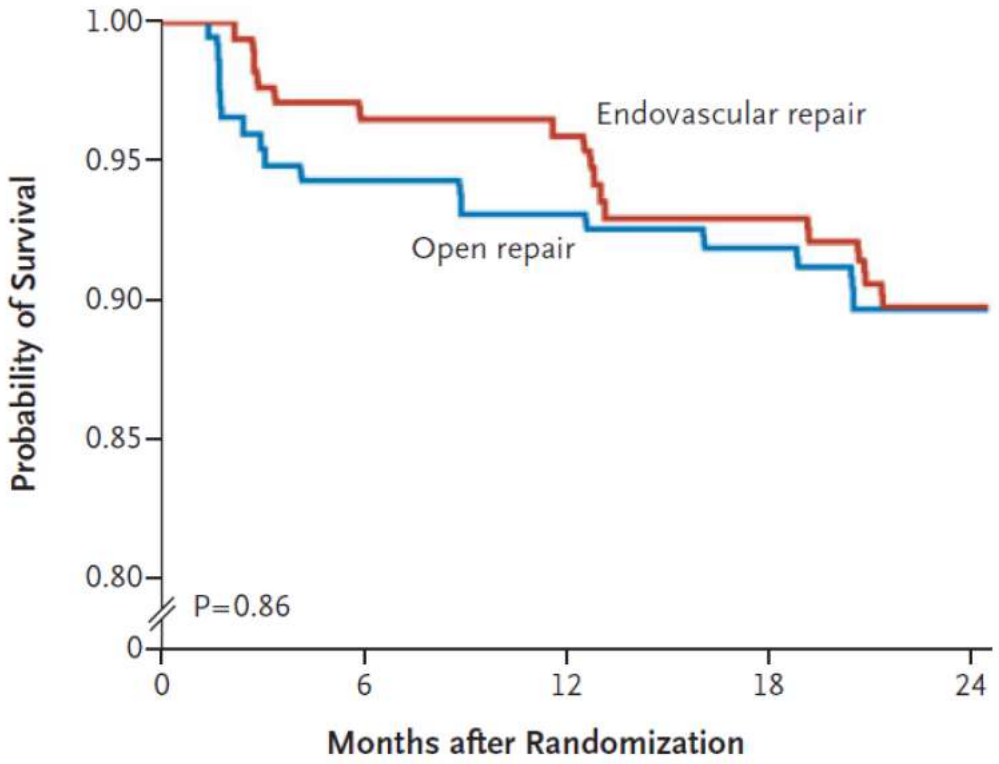
Исследование DREAM. 2005г.

Two-Year Outcomes after Conventional or Endovascular Repair of Abdominal Aortic Aneurysms

Jan D. Blankensteijn, M.D., Sjors E.C.A. de Jong, M.D., Monique Prinssen, M.D., Arie C. van der Ham, M.D., Jaap Buth, M.D., Steven M.M. van Sterkenburg, M.D., Hence J.M. Verhagen, M.D., Erik Buskens, M.D., and Diederick E. Grobbee, M.D., for the Dutch Randomized Endovascular Aneurysm Management (DREAM) Trial Group*

NEJM 2005

DREAM. Выживаемость



Исследование OVER. 2009г.

Outcomes Following Endovascular vs Open Repair of Abdominal Aortic Aneurysm

A Randomized Trial

JAMA 2009

Frank A. Lederle, MD
Julie A. Freischlag, MD
Tassos C. Kyriakides, PhD
Frank T. Padberg Jr, MD
Jon S. Matsumura, MD
Ted R. Kohler, MD
Peter H. Lin, MD
Jessie M. Jean-Claude, MD
Dolores F. Cikrit, MD
Kathleen M. Swanson, MS, RPh
Peter N. Peduzzi, PhD
for the Open Versus Endovascular Repair (OVER) Veterans Affairs Cooperative Study Group

Context Limited data are available to assess whether endovascular repair of abdominal aortic aneurysm (AAA) improves short-term outcomes compared with traditional open repair.

Objective To compare postoperative outcomes up to 2 years after endovascular or open repair of AAA in a planned interim report of a 9-year trial.

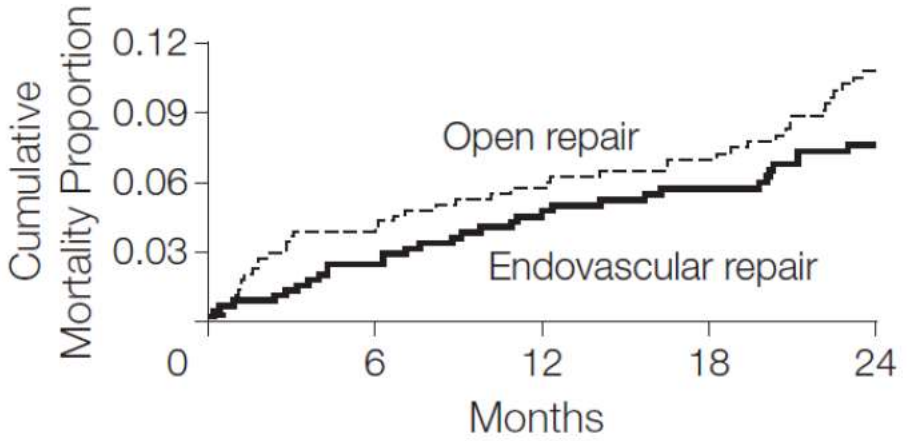
Design, Setting, and Patients A randomized, multicenter clinical trial of 881 veterans (aged ≥49 years) from 42 Veterans Affairs Medical Centers with eligible AAA who were candidates for both elective endovascular repair and open repair of AAA. The trial is ongoing and this report describes the period between October 15, 2002, and October 15, 2008.

Intervention Elective endovascular (n=444) or open (n=437) repair of AAA.

Main Outcome Measures Procedure failure, secondary therapeutic procedures, length of stay, quality of life, erectile dysfunction, major morbidity, and mortality.

Results Mean follow-up was 1.8 years. Perioperative mortality (30 days or inpatient) was lower for endovascular repair (0.5% vs 3.0%; *P*=.004), but there was no significant difference in mortality at 2 years (7.0% vs 9.8%, *P*=.13). Patients in the endovascular repair group had reduced median procedure time (2.9 vs 3.7 hours), blood loss (200 vs 1000 ml), transfusion requirement (0 vs 1.0 units), duration of mechani-

OVER. Выживаемость



No. at risk					
Open repair	437	420	396	363	310
Endovascular repair	444	433	411	371	326

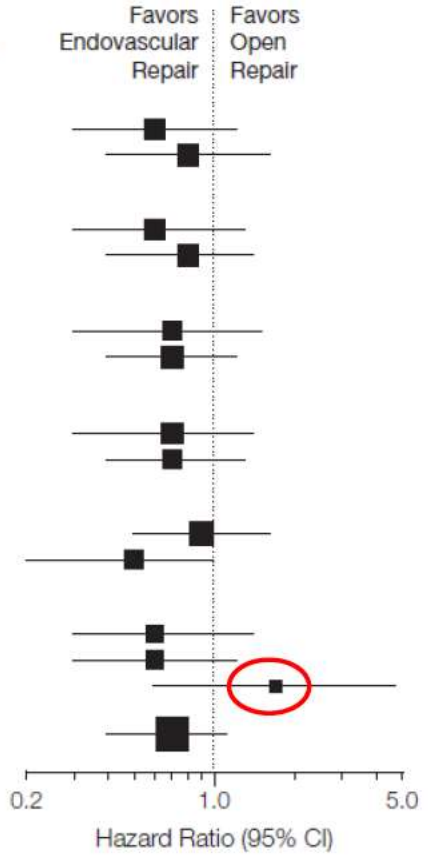
There was no significant difference in cumulative mortality for open vs endovascular repair (hazard ratio, 0.7; 95% confidence interval, 0.4-1.1; log-rank $P=.13$).

JAMA 2009

OVER. Летальность

Figure 3. Hazard Ratios for Death According to Baseline Characteristics

Subgroup	No. Patients	No. Deaths	Hazard Ratio (95% CI)
Randomization period			
Before April 15, 2005	413	40	0.6 (0.3-1.2)
After April 15, 2005	468	34	0.8 (0.4-1.6)
Age, y			
<70	406	26	0.6 (0.3-1.3)
≥70	475	48	0.8 (0.4-1.4)
AAA diameter, cm			
<5.5	382	27	0.7 (0.3-1.5)
≥5.5	499	47	0.7 (0.4-1.2)
Surgical risk (RAND score)			
Low	467	29	0.7 (0.3-1.4)
Intermediate or high	405	42	0.7 (0.4-1.3)
Coronary artery disease			
No	522	43	0.9 (0.5-1.6)
Yes	359	31	0.5 (0.2-1.0)
Intended endovascular system			
Cook Zenith	341	26	0.6 (0.3-1.4)
Gore Excluder	327	28	0.6 (0.3-1.2)
Medtronic AneuRx	186	15	1.7 (0.6-4.7)
Overall	881	74	0.7 (0.4-1.1)



JAMA 2009

Результаты 3 исследований

Trial	Site	Enrollment Start	30-d Mortality Open	30-d Mortality EVAR	Reinterv Open	Reinterv EVAR
EVAR-1	UK	1999	6.2%	2.1%	9%	20%
DREAM	Netherlands, Belgium	2000	4.6%	1.2%	5%	14%
OVER	USA (VA)	2002	2.3%	0.2%	12.5%	13.7%

Исследование US IDE

N=150 patients

Prospective, Multi-Center, Non randomized

N=26 U.S. sites, Enrollment 6/2008-4/2009

1˚ Safety Endpoint: 30D MAE

1˚Effectiveness Endpoint: Successful aneurysm treatment at 12M

Follow up: 30D, 6M, 12M & annually through 5Y

Endurant Bifur N=150

≥10 mm proximal neck length

≤ 60º infrarenal angulation

≤ 45º suprarenal angulation

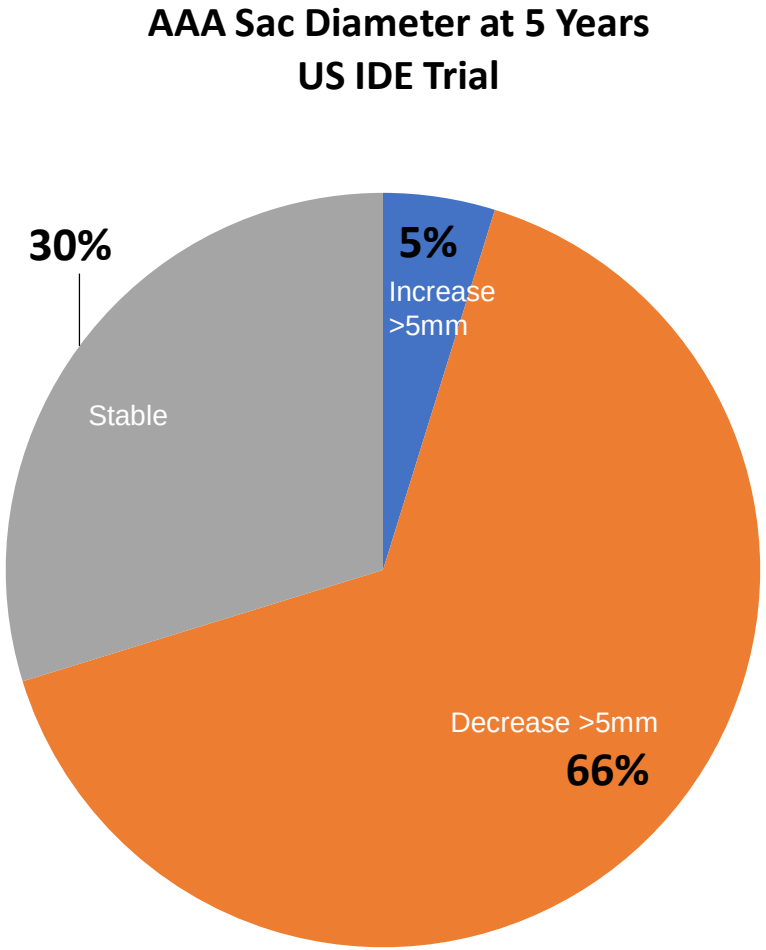
Woo, Ed. VIVA 2014.

Результаты через 5 лет

US IDE Trial	30 Days	1 Year	5 Year
Type I/III Endoleak	0.3%	0%	**0%**
Type II Endoleak	16.1%	9.1%	**4.1%**
Migration	0%	0%	**0%**
Conversion	0%	0%	**0%**
Secondary Procedure	98.7% FF	95.3% FF	**89% FF**
Aneurysm-Related Mortality	100% FF	100% FF	**99.2% FF**

Core laboratory reported data. Endoleak rates are reported as “at measurements”
Singh, Michael. SVS 2015.
Endurant US IDE. Medtronic database

Изменения аневризматического мешка через 5 лет



- 95.2% aneurysm sac decrease >5mm or stable at 5 years
- 65.5% with significant >5mm sac shrinkage

Increase >5mm
Decrease >5mm
Stable

Core laboratory reported data
Singh, Michael. SVS 2015.
Endurant US IDE. Medtronic database

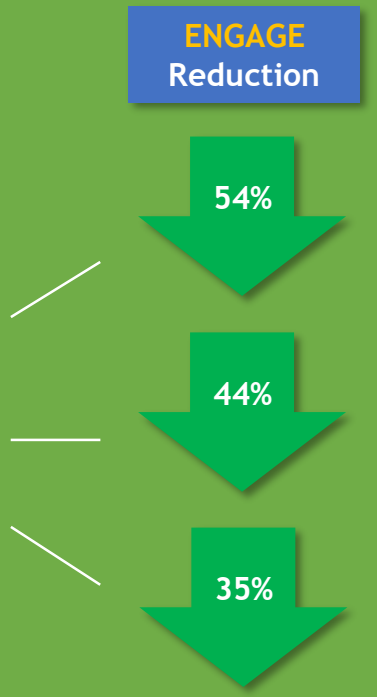
There is no need to compromise on clinical Innovation.

THE ENGAGE REGISTRY DEMONSTRATES HOW EVAR EVOLUTION HAS CONTRIBUTED TO IMPROVED PATIENTS OUTCOMES[1]

Endurant™ system sets a new benchmark for EVAR device performance[1]

Is the Endurant™ stent graft system more effective than previous generation devices?

Outcomes Through 4Y	EVAR Arm of EVAR I Trial[2]	Endurant™ system in ENGAGE Registry
ARM	3.5% (19/543)	1.6% (20/1,263)
Ruptures	0.9% (5/532)	0.5% (6/1263)
Reinterventions	20%	13%



[1] *Dittmar Bockler, MD, PhD, MHBA. Dept of Vasc & Endovasc Surgery. University Hospital Heidelberg,* Charing Cross 2016

[2] EVAR1 trial compared OSR (n=626) vs EVAR (n=626) with 1st generation aortic stent graft systems: Zenith™*, Excluder™*, Talent™, AneuRx™, and Quantum™* / TERAMed™* (Co

EVAR 3.0 ☺

Long-Term Outcomes of Endovascular vs. Open Aneurysm Repair in the VQI-VISION Database

Kevin Yei, Nadin Elsayed, Asma Mathlouthi, Mahmoud Malas

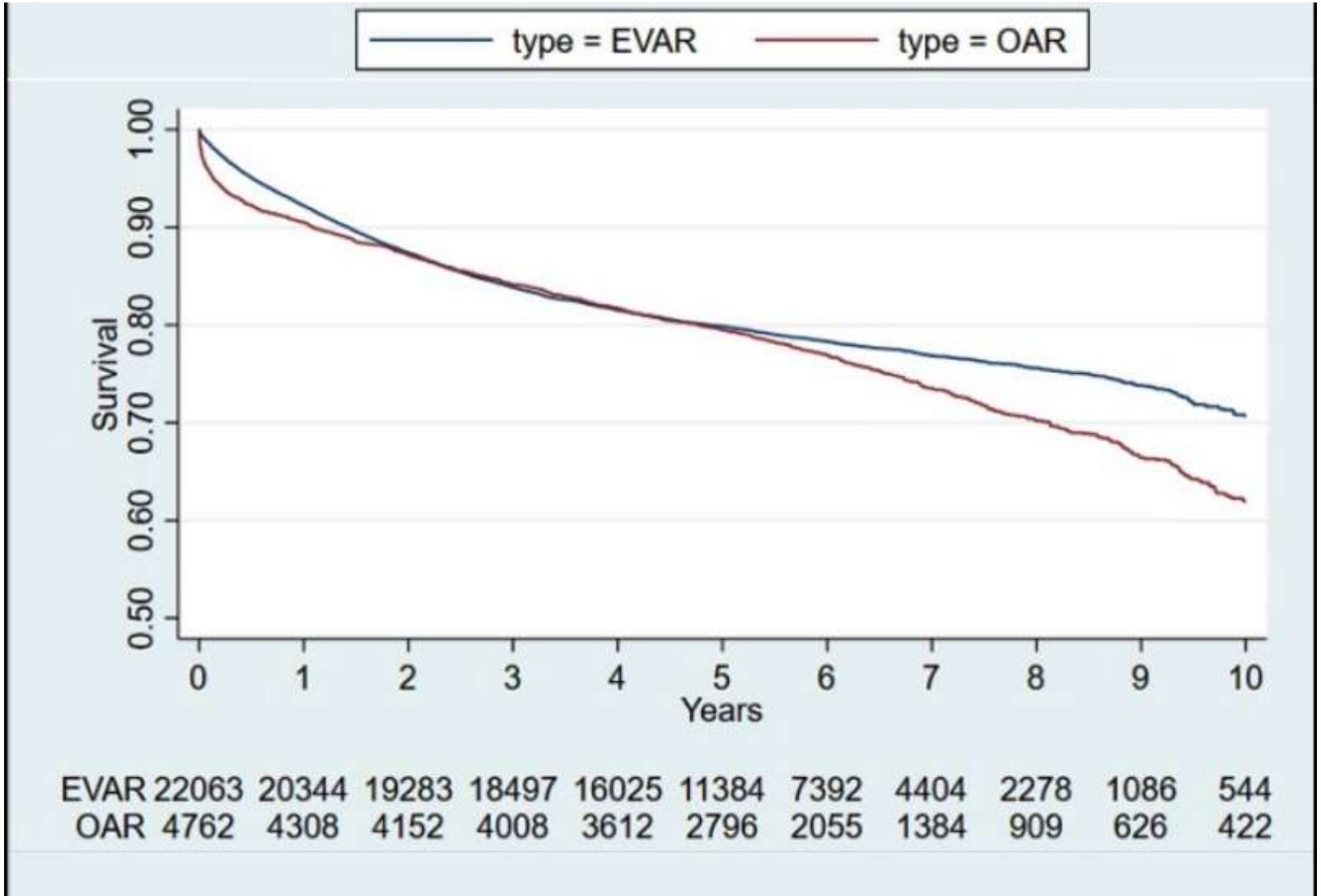
University of California San Diego, La Jolla, CA

База данных VQI-VISION:
22 080 EVAR и 4 783 OAR. Наблюдение 10 лет

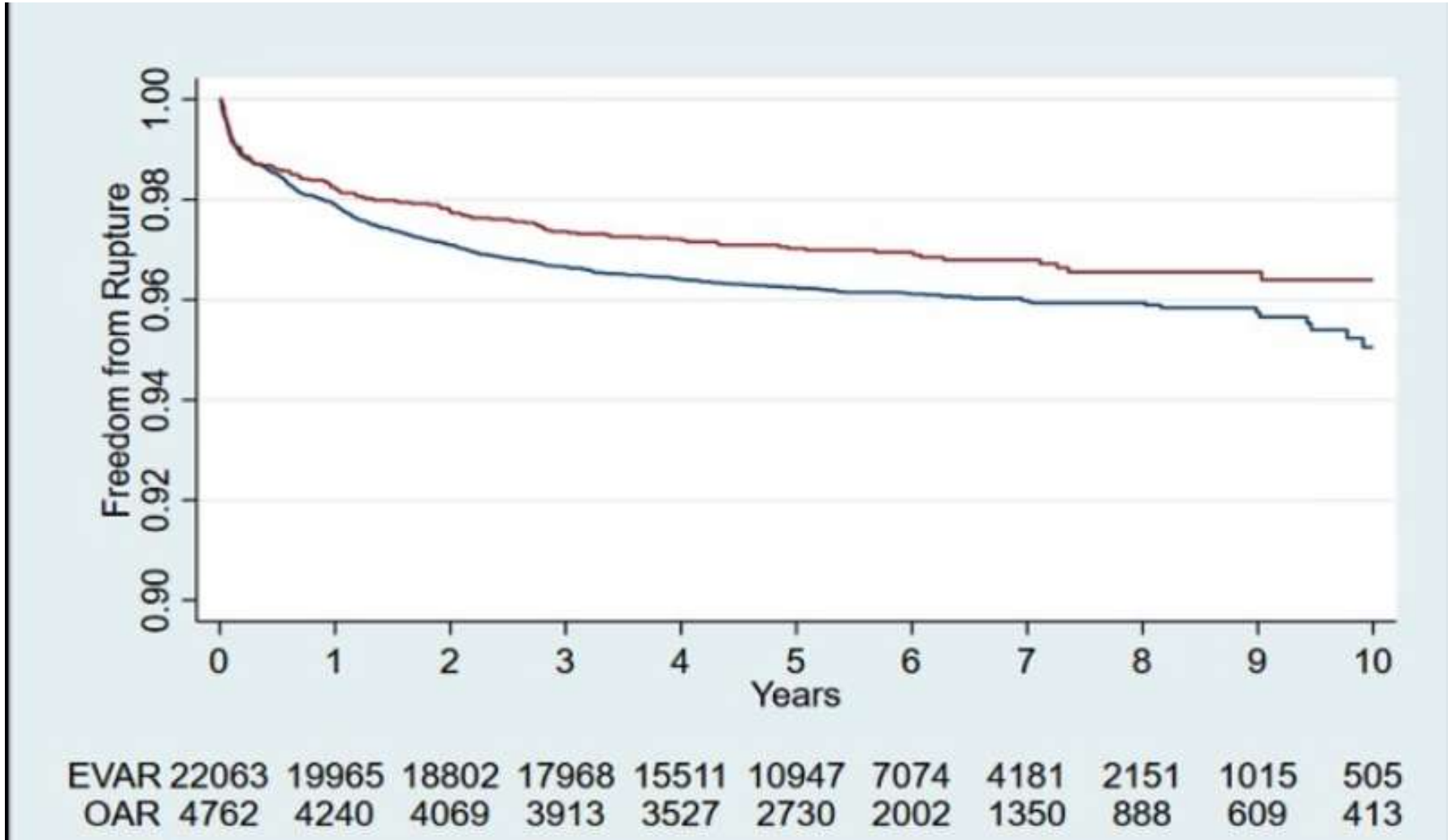
Летальность и разрыв

		EVAR, % Freedom(n=22080, 82.2%)	OAR, % Freedom(n=4783,17.8%)	Log-Rank	aHR (OAR:EVAR)	p-value
1-Year	Mortality	92.21%	90.47%	<0.001	1.23 (1.09-1.40)	<0.001
	Rupture	97.89%	98.23%	0.16	0.72 (0.52-0.99)	0.041
	Reintervention	94.81%	97.34%	<0.001	0.42 (0.33-0.53)	<0.001
5-Year	Mortality	79.86%	79.49%	0.47	1.07 (0.98-1.17)	0.138
	Rupture	96.24%	97.03%	0.0124	0.64 (0.50-0.83)	<0.001
	Reintervention	89.81%	95.09%	<0.001	0.38 (0.33-0.45)	<0.001
10-Year	Mortality	70.68%	61.94%	<0.001	1.19 (1.08-1.31)	<0.001
	Rupture	97.03%	96.40%	0.0122	0.66 (0.54-0.86)	0.001
	Reintervention	88.33%	92.59%	<0.001	0.41 (0.35-0.48	<0.001

Выживаемость



Разрыв


Freedom from Rupture
0.90
0.92
0.94
0.96
0.98
1.00
0
1
2
3
4
5
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9
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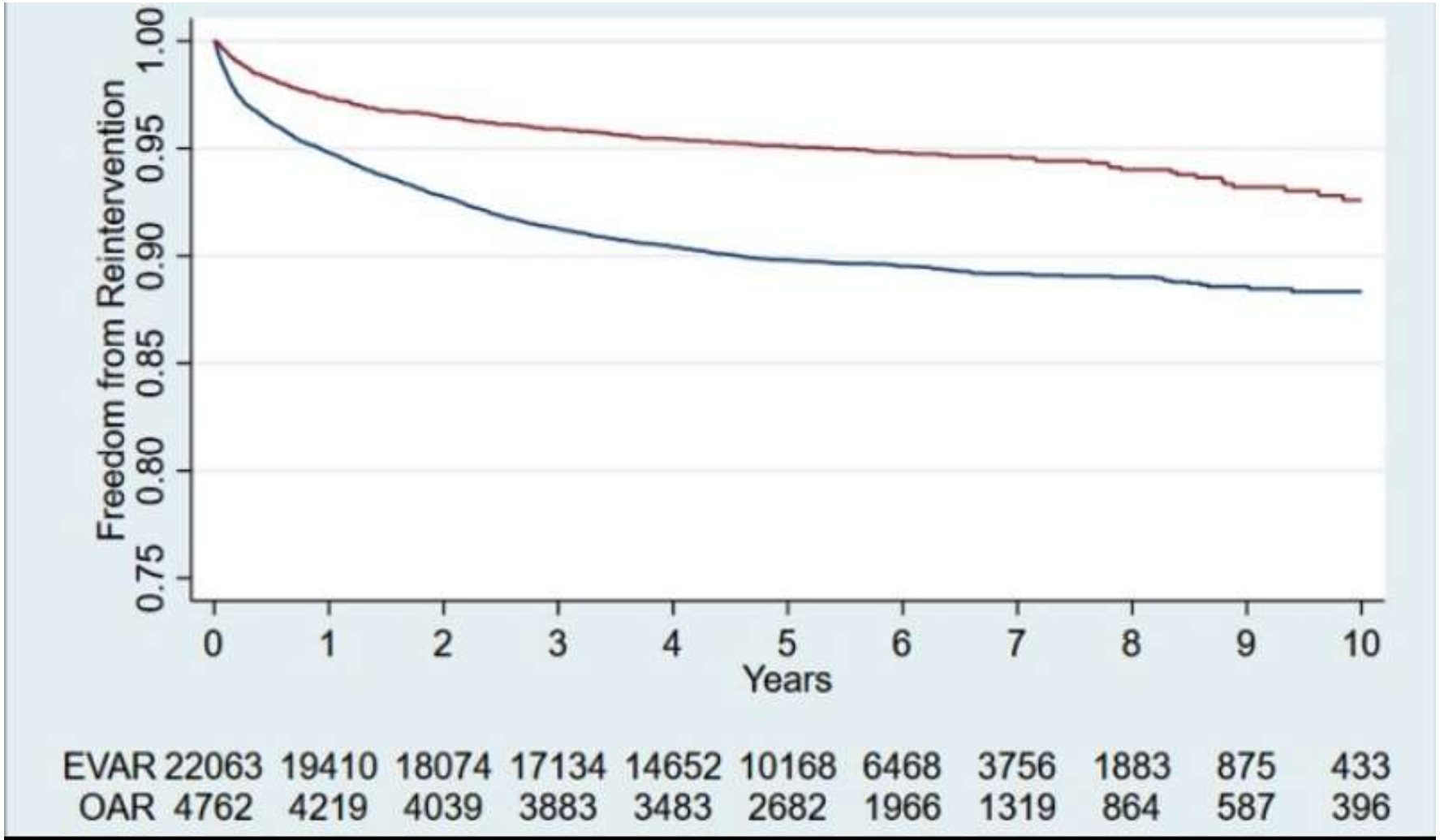
Years
EVAR 22063 19965 18802 17968 15511 10947 7074 4181 2151 1015 505
OAR 4762 4240 4069 3913 3527 2730 2002 1350 888 609 413

Реинтервенции

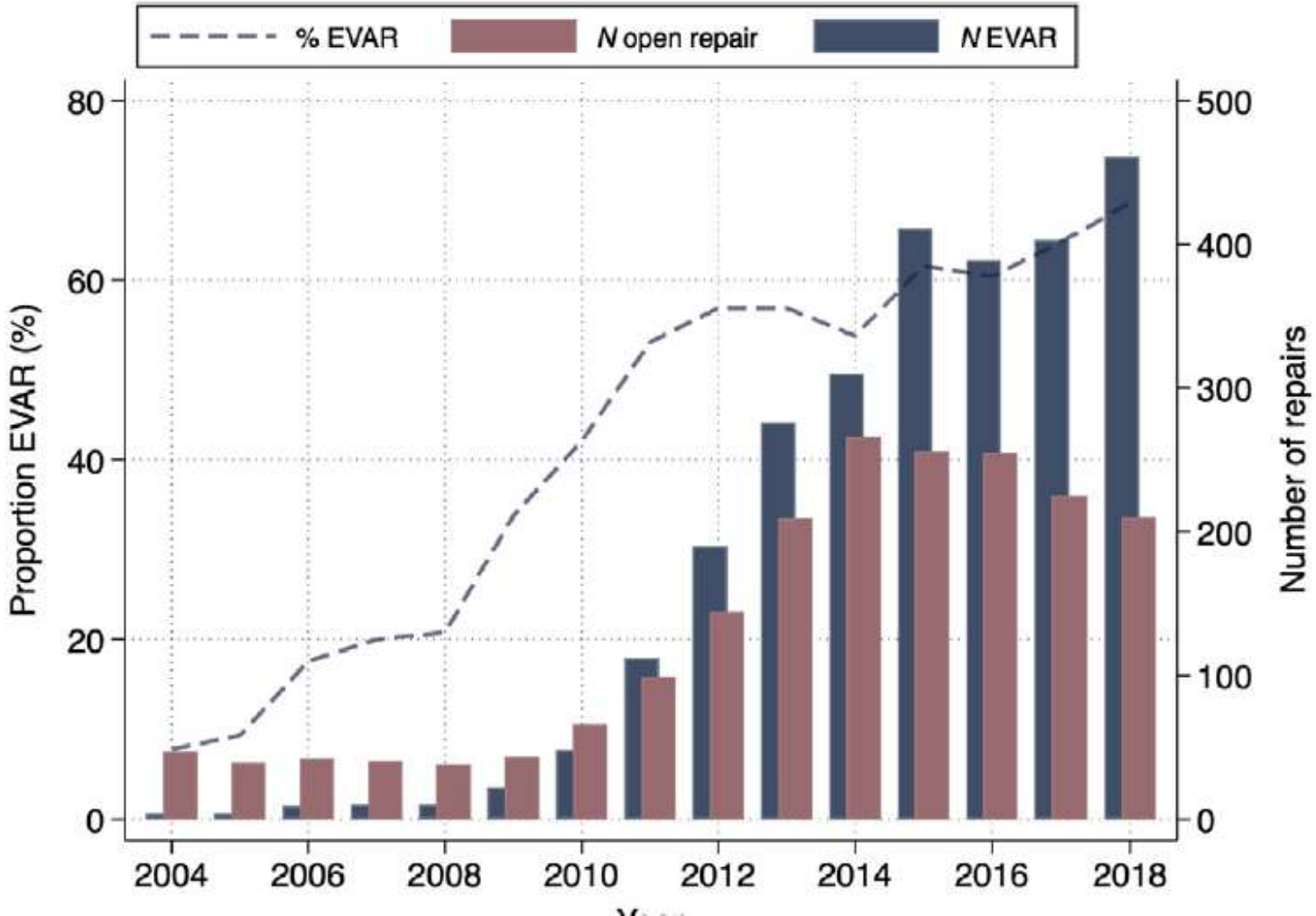


Five-year survival following endovascular repair of ruptured abdominal aortic aneurysms is improving

Rens R. B. Varkevisser, BS,[a,b] Nicholas J. Swerdlow, MD,[a] Livia E. V. M. de Guerre, MD,[a] Kirsten Dansey, MD,[a] Lars Stangenberg, MD,[c] Kristina A. Giles, MD,[d] Hence J. M. Verhagen, MD, PhD,[b] *and* Marc. L. Schermerhorn, MD,[a] on behalf of the Society for Vascular Surgery Vascular Quality Initiative, *Boston, Mass; Rotterdam, The Netherlands; Providence, RI; and Gainesville, Fla*

4638 разрывов брюшной аорты. 2 когорты: 2004-2012 и 2013-2018

Соотношение эндоваскулярных и открытых операций



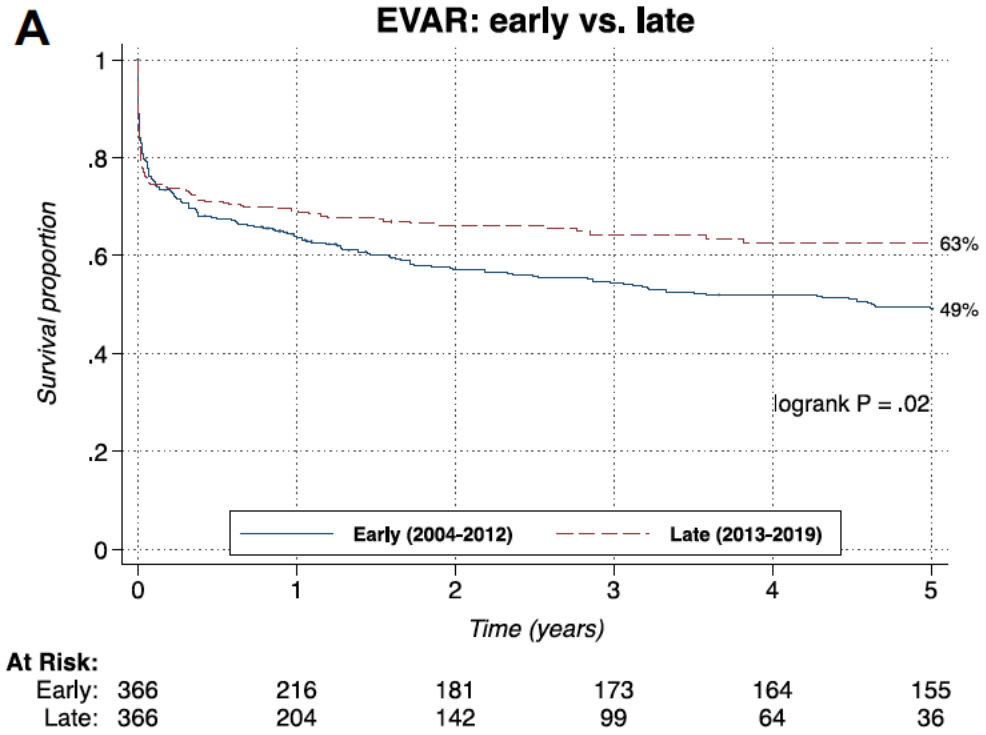
Анатомические и процедуральные характеристики

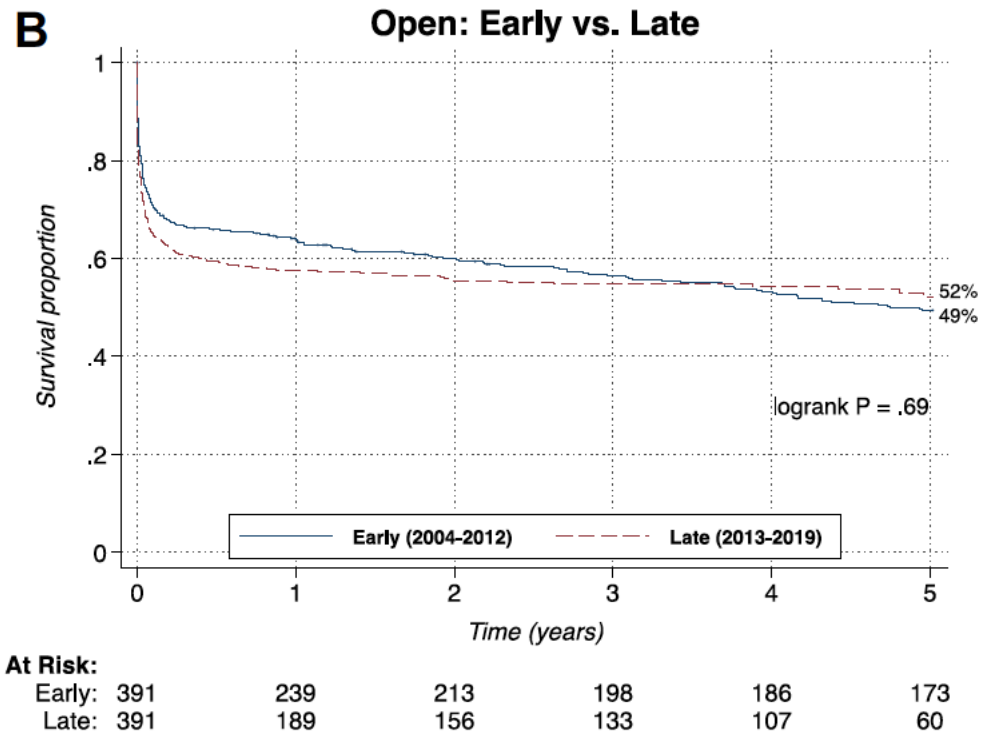
Table II. Anatomic and procedural characteristics

	EVAR			Open repair		
	Early	Late	*P* value	Early	Late	*P* value
No.	409	2250	–	558	1421	–
Maximum AAA diameter, mm	73 ± 21	74 ± 20	.72	79 ± 20	78 ± 21	.64
Iliac aneurysm	19	25	**.015**	23	22	.72
Aorto-uni-iliac device	17	10	**<.001**	–	–	–
Lowest preintubation SBP, mm Hg			.80			.06
<60	12	10		19	15	
60-75	19	19		22	22	
75-90	16	18		15	19	
90-120	31	31		25	27	
≥120	22	22		19	18	
Intraoperative RBC transfusion	74	60	**<.001**	90	90	.78
Estimated blood loss, mL	300 (150-650)	150 (83-400)	**<.001**	3000 (1500-5000)	3000 (1500-5000)	.33
Procedure time, minutes	150 (113-208)	125 (90-180)	**<.001**	185 (142-245)	204 (153-273)	**<.001**
ICU LOS, days	2 (1-6)	2 (1-5)	.61	5 (2-12)	5 (2-11)	.90
Postoperative LOS, days	6 (3-12)	5 (2-10)	**.01**	9 (3-18)	9 (3-18)	.85
Transperitoneal approach	–	–	–	91	85	**.001**
Distal anastomosis on aorta	–	–	–	62	49	**<.001**
Unilateral hypogastric ligation	–	–	–	7.2	6.8	.73
Bilateral hypogastric ligation	–	–	–	3.9	4.4	.62
IMA management						
Occluded	–	–	–	58	50	**.002**
Ligated	–	–	–	38	42	.13
Reimplanted	–	–	–	3.6	7.7	**.001**
Thromboembolectomy	–	–	–	14	15	.58

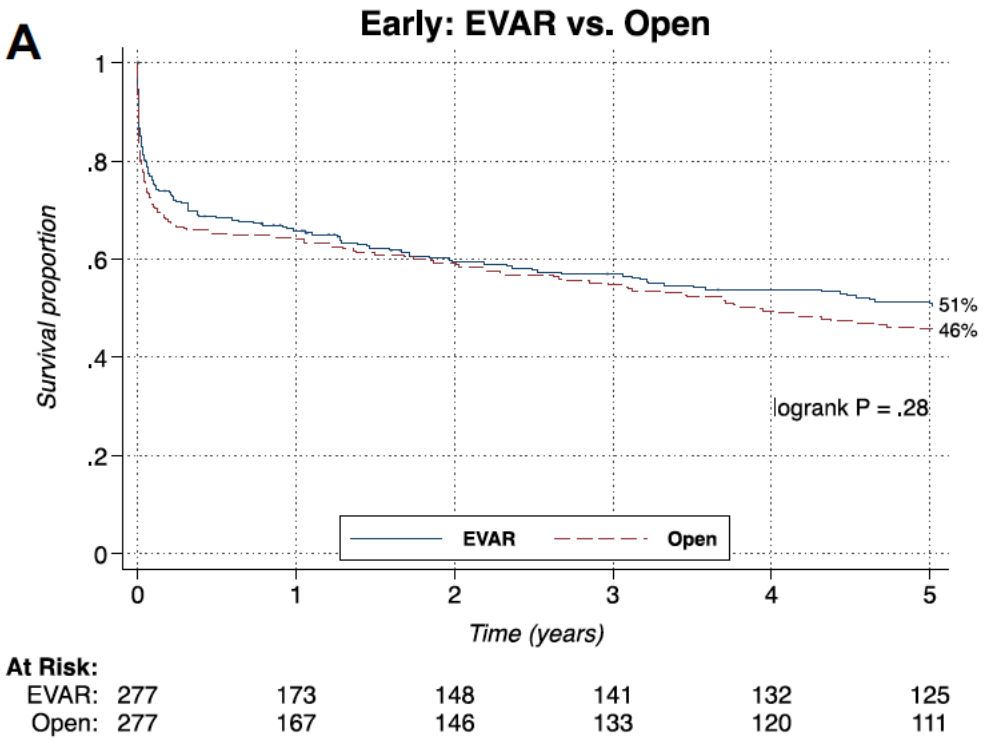
AAA, Abdominal aortic aneurysm; *EVAR*, endovascular aneurysm repair; *ICU*, intensive care unit; *IMA*, inferior mesenteric artery; *LOS*, length of stay; *SBP*, systolic blood pressure; *RBC*, red blood cell.
Values are mean ± standard deviation, median (interquartile range), or percentages. Boldface *P* values represent significance ($P < .05$).

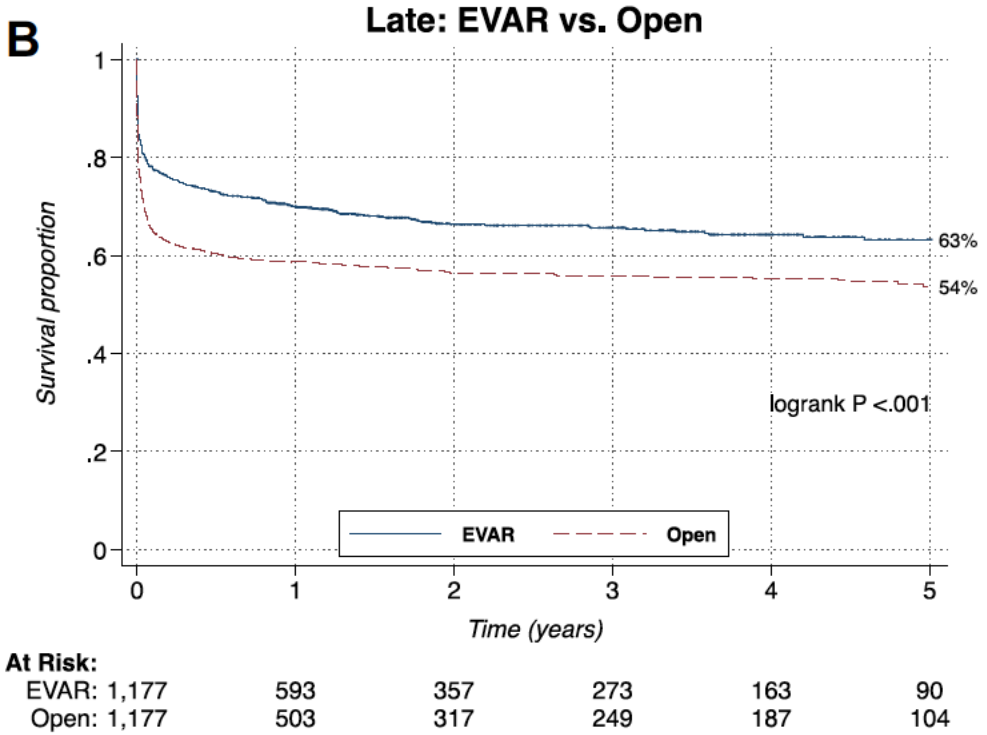
Выживаемость в когортах пациентов





Выживаемость в когортах, в зависимости от метода операции



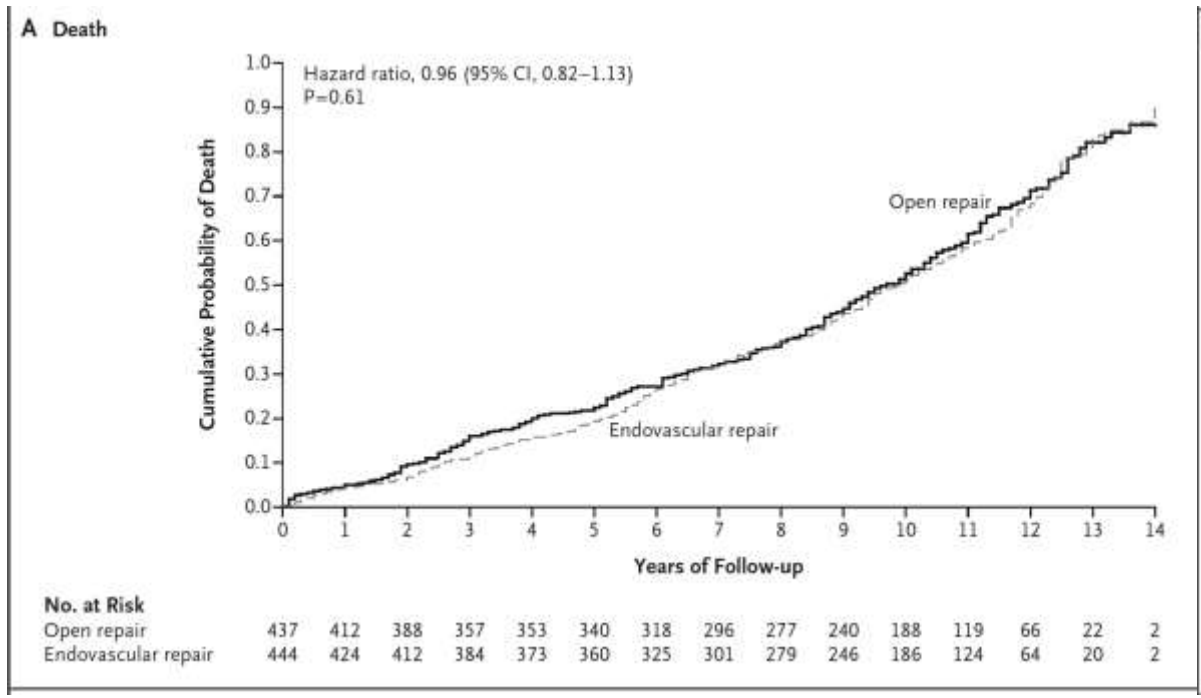


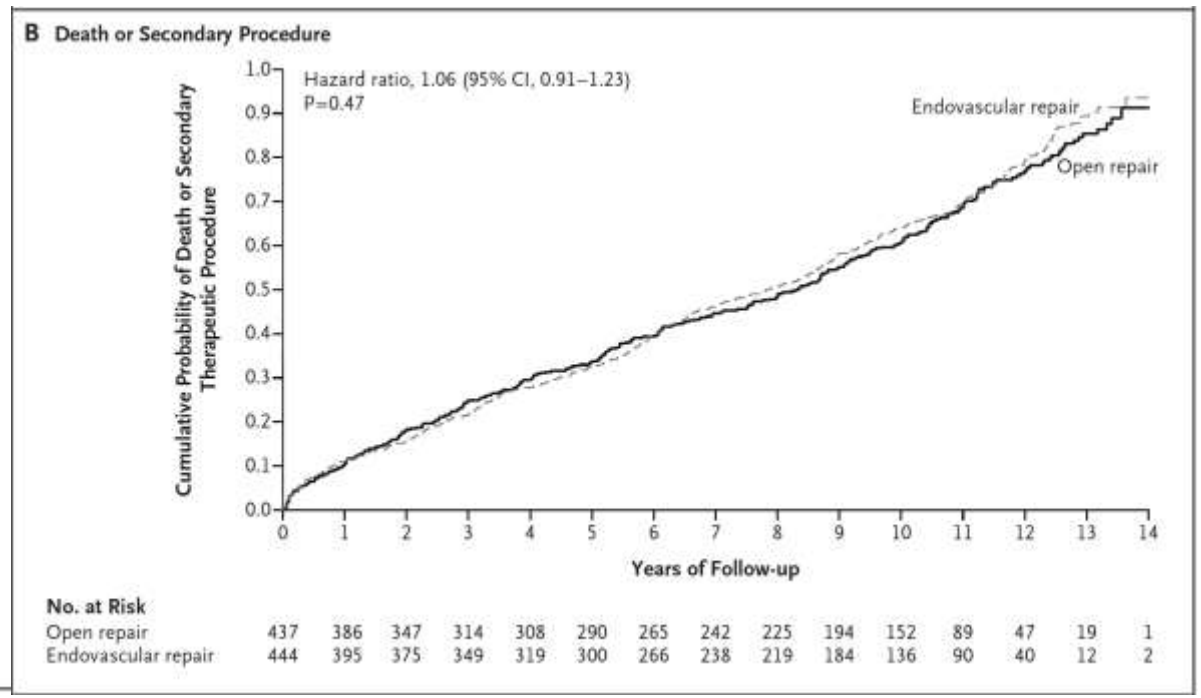
Open versus Endovascular Repair of Abdominal Aortic Aneurysm

Frank A. Lederle, M.D.,* Tassos C. Kyriakides, Ph.D., Kevin T. Stroupe, Ph.D., Julie A. Freischlag, M.D., Frank T. Padberg, Jr., M.D., Jon S. Matsumura, M.D., Zhiping Huo, M.S., and Gary R. Johnson, M.S., for the OVER Veterans Affairs Cooperative Study Group†

Многоцентровое рандомизированное исследование. Рандомизировано 881 больных

Смерть и повторные операции



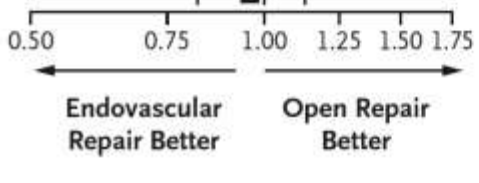


Смерть от всех причин

Time since Randomization	Endovascular Repair	Open Repair	Hazard Ratio (95% CI)	P Value	P Value for Interaction†
	no. of deaths/total no. (%)				
Any time	302/444 (68.0)	306/437 (70.0)	0.96 (0.82–1.13)	0.61	0.25
0 to 6 mo	11/444 (2.5)	14/437 (3.2)	0.77 (0.35–1.69)	0.51	0.43
>6 mo to 4 yr	59/433 (13.6)	70/423 (16.5)	0.81 (0.57–1.14)	0.22	0.88
>4 to 8 yr	93/374 (24.9)	76/353 (21.5)	1.18 (0.87–1.60)	0.29	0.50
>8 yr	139/281 (49.5)	146/277 (52.7)	0.94 (0.74–1.18)	0.59	0.25

Факторы, влияющие на летальность

Subgroup	Endovascular Repair	Open Repair	Hazard Ratio for Death (95% CI)	P Value for Interaction
	no. of patients who died/total no. of patients (%)			
Randomization period				0.81
Up to April 15, 2005	156/212 (73.6)	155/201 (77.1)	0.98 (0.79–1.23)	
After April 15, 2005	146/232 (62.9)	151/236 (64.0)	0.95 (0.76–1.20)	
Age				0.02
<70 yr	120/218 (55.0)	111/188 (59.0)	0.81 (0.62–1.05)	
≥70 yr	182/226 (80.5)	195/249 (78.3)	1.20 (0.98–1.47)	
AAA diameter				0.99
<5.5 cm	132/192 (68.8)	127/190 (66.8)	0.96 (0.75–1.23)	
≥5.5 cm	170/252 (67.5)	179/247 (72.5)	0.96 (0.78–1.19)	
Surgical risk				0.19
Low	145/240 (60.4)	152/228 (66.7)	0.87 (0.69–1.10)	
Intermediate or high	154/200 (77.0)	149/204 (73.0)	1.09 (0.87–1.37)	
Coronary artery disease				0.54
No	184/270 (68.1)	175/252 (69.4)	1.00 (0.81–1.23)	
Yes	118/174 (67.8)	131/185 (70.8)	0.91 (0.71–1.17)	
Intended endovascular-repair device				
Cook Zenith	108/166 (65.1)	117/175 (66.9)	0.97 (0.74–1.26)	
Gore Excluder	117/177 (66.1)	105/150 (70.0)	0.91 (0.70–1.19)	0.65
Medtronic AneuRx	67/88 (76.1)	72/98 (73.5)	1.06 (0.76–1.48)	0.56
All patients	302/444 (68.0)	306/437 (70.0)	0.96 (0.82–1.13)	



Original Investigation | Surgery

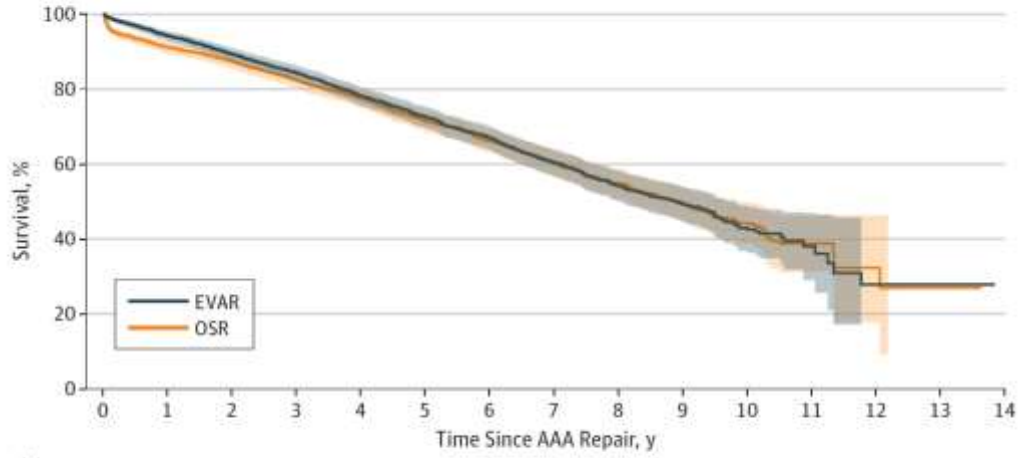
Comparison of Outcomes in Elective Endovascular Aortic Repair vs Open Surgical Repair of Abdominal Aortic Aneurysms

Konrad Salata, MD; Mohamad A. Hussain, MD, PhD; Charles de Mestral, MD, PhD; Elisa Greco, MD, MEd; Badr A. Aljabri, MD; Muhammad Mamdani, PharmD, MPH, MA; Thomas L. Forbes, MD; Deepak L. Bhatt, MD, MPH; Subodh Verma, MD, PhD; Mohammed Al-Omran, MD, MSc

Регистр Онтарио. 17 683 больных

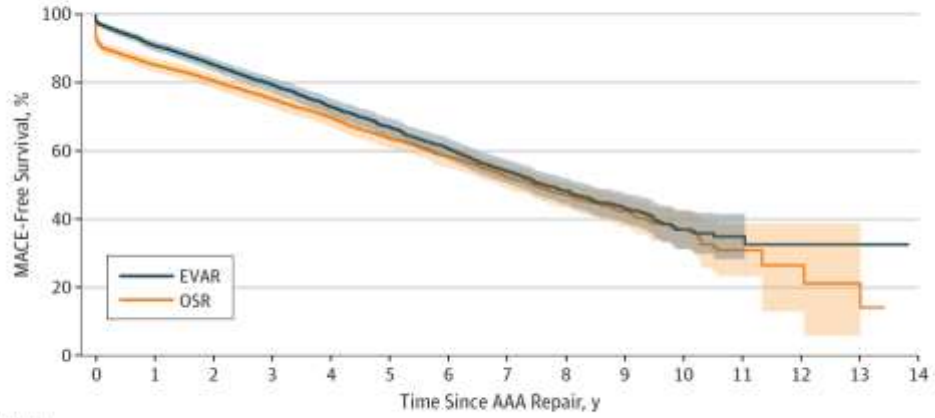
Выживаемость и выживаемость без происшествий

Figure 1. Kaplan-Meier Curve of Survival After Elective Abdominal Aortic Aneurysm (AAA) Treatment by Endovascular Aortic Repair (EVAR) and Open Surgical Repair (OSR)



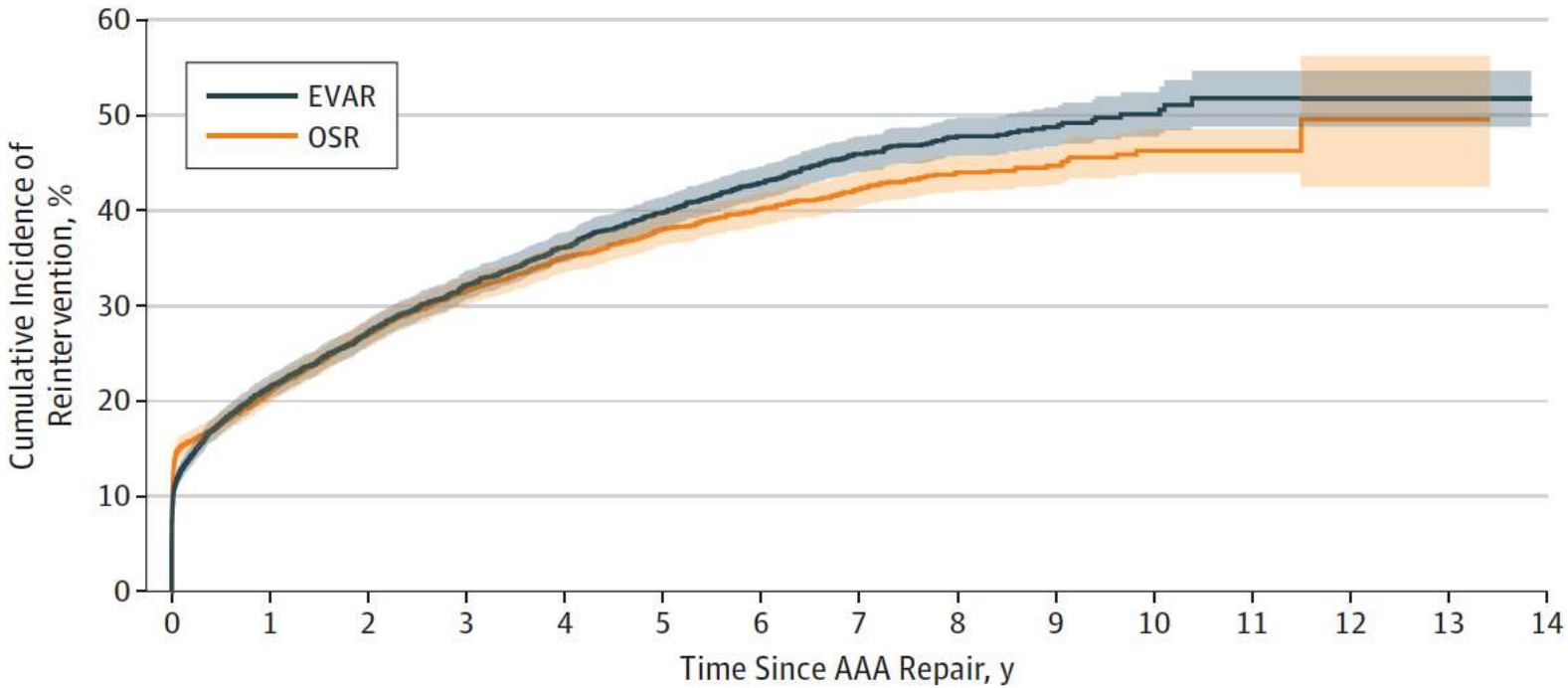
No. at risk															
EVAR	4010	3769	3166	2596	2049	1580	1127	760	453	238	95	23	9	8-4[a]	0
OSR	4010	3647	3097	2537	2057	1567	1144	775	467	235	94	27	6	5-1[a]	0

Figure 2. Kaplan-Meier Curve of Major Adverse Cardiovascular Event (MACE)-Free Survival After Elective Abdominal Aortic Aneurysm (AAA) Treatment by Endovascular Aortic Repair (EVAR) and Open Surgical Repair (OSR)



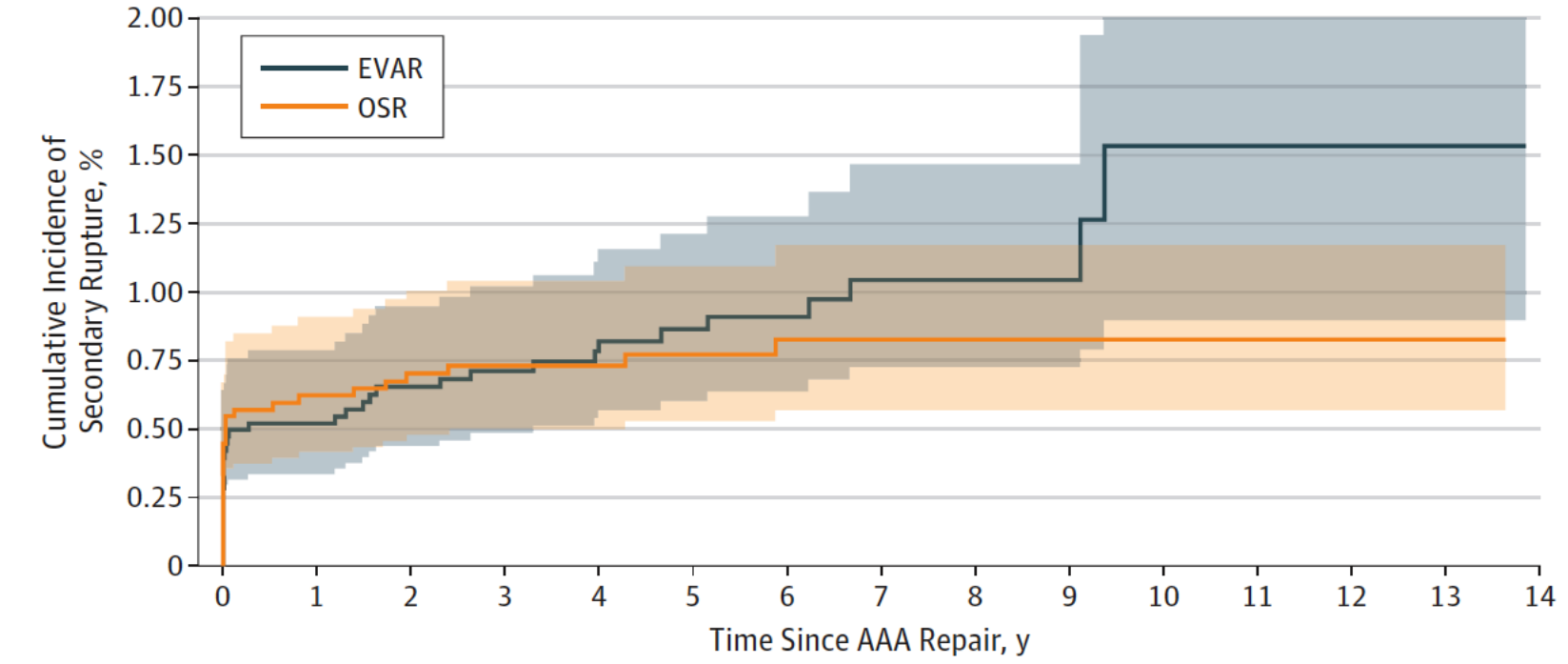
No. at risk															
EVAR	4010	3639	3026	2446	1905	1457	1013	665	395	200	79	18	7	6-2[a]	0
OSR	4010	3413	2855	2304	1837	1392	1013	673	396	195	74	18	5-1[a]	5-4[a]	0

Реинтервенции



No. at risk														
EVAR	4010	3008	2366	1815	1343	983	647	411	240	115	46	6	0	0	0
OSR	4010	2937	2305	1793	1359	962	675	437	254	125	47	16	0	0	0

Вторичный разрыв



No. at risk

EVAR	4010	3632	3081	2525	2045	1565	1143	773	468	237	95	29	7	5-1[a]	5-1[a]
OSR	4010	3753	3155	2587	2040	1572	1127	761	454	239	95	24	10	9-5[a]	5-1[a]

Фенестрированные и бранчированные устройства

Editor's Choice – Fenestrated or Branched Endovascular *versus* Open Repair for Complex Aortic Aneurysms: Meta-Analysis of Time to Event Propensity Score Matched Data

George A. Antoniou [a,b,*], Maciej T. Juszczak [c,d], Stavros A. Antoniou [e,f], Athanasios Katsargyris [g], Stephan Haulon [h]

[a] Department of Vascular and Endovascular Surgery, The Royal Oldham Hospital, Pennine Acute Hospitals NHS Trust, Northern Care Alliance NHS Group, Manchester, UK
[b] Division of Cardiovascular Sciences, School of Medical Sciences, The University of Manchester, Manchester, UK
[c] Birmingham Aortic Team, University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK
[d] Institute of Inflammation and Ageing, University of Birmingham, Birmingham, UK
[e] Medical School, European University of Cyprus, Nicosia, Cyprus
[f] Department of Surgery, Mediterranean Hospital of Cyprus, Limassol, Cyprus
[g] Department of Vascular and Endovascular Surgery, Paracelsus Medical University Nuremberg, General Hospital Nuremberg, Nuremberg, Germany
[h] Vascular Centre, Hôpital Marie Lannelongue, Groupe Hospitalier Paris Saint Joseph, INSERM UMR_S999, Université Paris Saclay, Le Plessis-Robinson, France

Мета-анализ 11 исследований. 7 061 больных

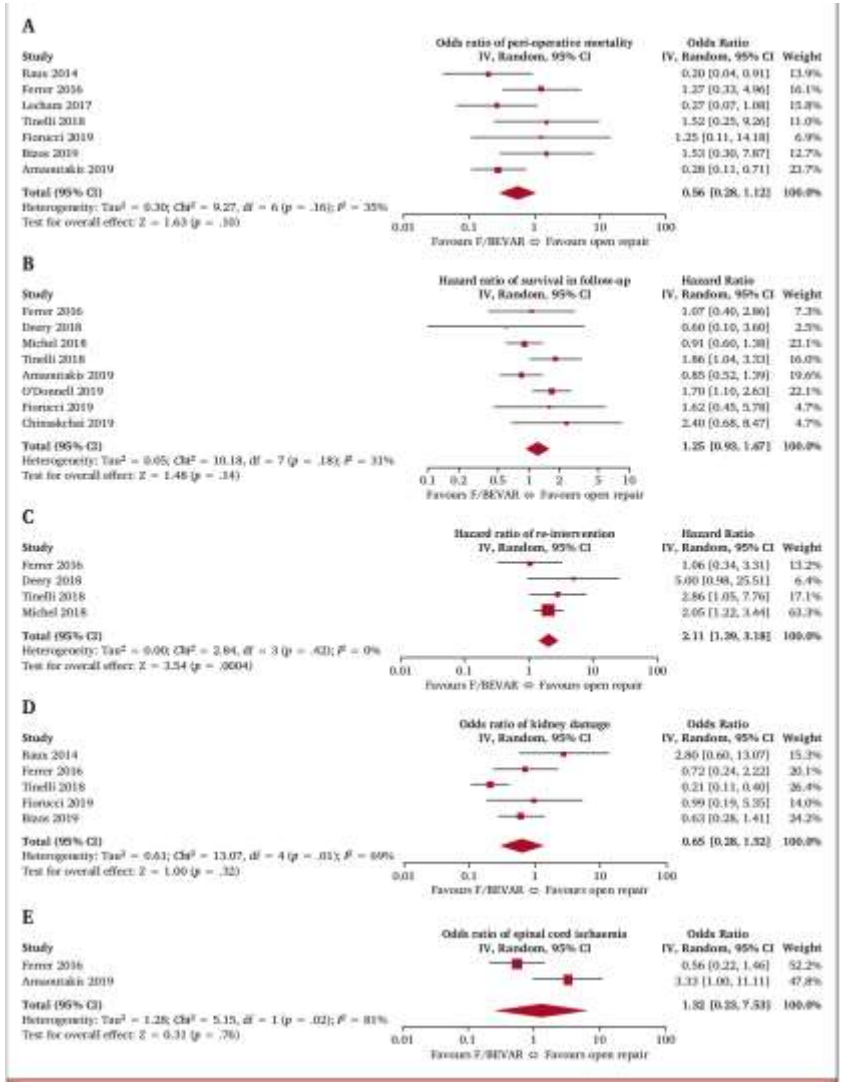
Включенные исследования

First author (country)	Journal (year)	Prospective/ retrospective	Single/ multicentre	Type of aneurysm	Recruitment period	FEVAR/ OSR – *n*
Arnaoutakis (USA)[11]	*J Vasc Surg* (2020)	Retrospective	Single	Crawford II and III	2002–18	92/66
O'Donnell (USA)[12]	*Ann Surg* (2020)	Not mentioned, but most probably retrospective	Multi*	NR	2012–18	1 128/ 2 125
Fiorucci (Germany)[13]	*J Endovasc Ther* (2019)	Retrospective	Multi	Pararenal AAA	1998–2015	41/102
Chinsakchai (Thailand)[14]	*Ann Vasc Surg* (2019)	Retrospective	Single	Juxtarenal	2011–16	20/32
Bizos (France)[15]	*Eur J Vasc Endovasc Surg* (2019)	Not mentioned, but most probably retrospective	Multi	Juxtarenal	2005–17	102/51
Tinelli (Italy)[16]	*J Vasc Surg* (2018)	Retrospective	Multi	Pararenal AAA	2010–16	102/102
Deery (USA)[17]	*Ann Vasc Surg* (2018)	Retrospective	Single	Juxtarenal/suprarenal/ supravisceral AAA excluding TAAA extent IV	2010–15	18/98
Michel (France)[18]	*Eur J Vasc Endovasc Surg* (2018)	Retrospective	Multi†	TAAA or complex AAA	2010–12	NR
Locham (USA)[19]	*J Am Coll Surg* (2017)	Not mentioned, but most probably retrospective	Multi‡	NR	2006–15	746/ 1 917
Ferrer (Italy)[20]	*J Vasc Surg* (2016)	Retrospective	Multi	TAAA	2007–14	65/65
Raux (USA)[21]	*J Vasc Surg* (2014)	Retrospective	Multi	NR	2001–12	42/147

Убедительность данных

Outcome and studies	Certainty assessment						Summary of findings
	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Overall certainty of evidence	Relative effect (95% CI)
Peri-operative mortality							
Seven observational studies	Not serious*	Not serious	Not serious	Serious†	None	⊕◯◯◯ VERY LOW	OR 0.56 (0.28–1.12)
Survival							
Eight observational studies	Serious‡	Not serious	Not serious	Not serious	None	⊕⊕⊕◯ MODERATE	HR 1.25 (0.93–1.67)
Re-intervention							
Four observational studies	Serious‡	Not serious	Not serious	Not serious	Strong association	⊕⊕⊕⊕ HIGH	HR 2.11 (1.39–3.18)
Kidney damage							
Five observational studies	Not serious*	Serious§	Not serious	Not serious	None	⊕◯◯◯ VERY LOW	OR 0.65 (0.28–1.52)
Spinal cord ischaemia							
Two observational studies	Not serious*	Serious‖	Not serious	Not serious	None	⊕◯◯◯ VERY LOW	OR 1.32 (0.23–7.53)

Результаты


A
Odds ratio of peri-operative mortality
IV, Random, 95% CI
Odds Ratio
IV, Random, 95% CI
Weight
Raux 2014 0.20 [0.04, 0.91] 13.9%
Ferrer 2016 1.27 [0.33, 4.96] 16.1%
Locham 2017 0.27 [0.07, 1.08] 15.8%
Tinelli 2018 1.52 [0.25, 9.26] 11.0%
Fiorucci 2019 1.25 [0.11, 14.18] 6.9%
Bizzo 2019 1.53 [0.30, 7.87] 12.7%
Antoniou 2019 0.28 [0.13, 0.71] 23.7%
Total (95% CI) 0.56 [0.28, 1.12] 100.0%
Heterogeneity: Tau² = 0.30; Chi² = 9.27, df = 6 (p = .16); I² = 35%
Test for overall effect: Z = 1.63 (p = .10)
0.01 0.1 1 10 100
Favours F/BEVAR Favours open repair
B
Hazard ratio of survival in follow-up
IV, Random, 95% CI
Hazard Ratio
IV, Random, 95% CI
Weight
Ferrer 2016 1.07 [0.40, 2.86] 7.3%
Deery 2018 0.60 [0.10, 3.60] 2.5%
Michel 2018 0.91 [0.60, 1.38] 23.1%
Tinelli 2018 1.86 [1.04, 3.33] 16.0%
Antoniou 2019 0.85 [0.52, 1.39] 19.6%
O'Donnell 2019 1.70 [1.10, 2.63] 22.1%
Fiorucci 2019 1.62 [0.45, 5.78] 4.7%
Chinnakotai 2019 2.40 [0.68, 8.47] 4.7%
Total (95% CI) 1.25 [0.93, 1.67] 100.0%
Heterogeneity: Tau² = 0.05; Chi² = 10.18, df = 7 (p = .18); I² = 31%
Test for overall effect: Z = 1.48 (p = .14)
0.1 0.2 0.5 1 2 5 10
Favours F/BEVAR Favours open repair
C
Hazard ratio of re-intervention
IV, Random, 95% CI
Hazard Ratio
IV, Random, 95% CI
Weight
Ferrer 2016 1.06 [0.34, 3.31] 13.2%
Deery 2018 5.00 [0.98, 25.51] 6.4%
Tinelli 2018 2.86 [1.05, 7.76] 17.1%
Michel 2018 2.05 [1.22, 3.44] 63.3%
Total (95% CI) 2.11 [1.39, 3.18] 100.0%
Heterogeneity: Tau² = 0.00; Chi² = 2.84, df = 3 (p = .42); I² = 0%
Test for overall effect: Z = 3.54 (p = .0004)
0.01 0.1 1 10 100
Favours F/BEVAR Favours open repair
D
Odds ratio of kidney damage
IV, Random, 95% CI
Odds Ratio
IV, Random, 95% CI
Weight
Raux 2014 2.80 [0.60, 13.07] 15.3%
Ferrer 2016 0.72 [0.24, 2.22] 20.1%
Tinelli 2018 0.21 [0.11, 0.40] 26.4%
Fiorucci 2019 0.99 [0.19, 5.35] 14.0%
Bizzo 2019 0.63 [0.28, 1.41] 24.2%
Total (95% CI) 0.65 [0.28, 1.52] 100.0%
Heterogeneity: Tau² = 0.61; Chi² = 13.07, df = 4 (p = .01); I² = 69%
Test for overall effect: Z = 1.00 (p = .32)
0.01 0.1 1 10 100
Favours F/BEVAR Favours open repair
E
Odds ratio of spinal cord ischaemia
IV, Random, 95% CI
Odds Ratio
IV, Random, 95% CI
Weight
Ferrer 2016 0.56 [0.22, 1.46] 52.2%
Antoniou 2019 3.33 [1.00, 11.11] 47.8%
Total (95% CI) 1.32 [0.33, 7.53] 100.0%
Heterogeneity: Tau² = 1.28; Chi² = 5.15, df = 1 (p = .02); I² = 81%
Test for overall effect: Z = 0.31 (p = .76)
0.01 0.1 1 10 100
Favours F/BEVAR Favours open repair

Вывод

- Обнадёживающие результаты, но требуется большое количество дополнительных исследований

Recommendations on the Use of Open Surgical and Endovascular Aneurysm Repair for the Management of Unruptured Abdominal Aortic Aneurysm from the Guideline Development Committee Appointed by the UK National Institute for Health and Care Excellence

Стреляю себе в колено ☺

Рекомендации NICE и GDC

Table 1. **National Institute for Health and Care Excellence Guideline Development Committee (GDC) recommendations on elective open surgical (OSR) or endovascular (EVAR) repair of unruptured abdominal aortic aneurysm (AAA)**

Theme	GDC final recommendation
When to offer AAA repair and discussion of risks and benefits	1.5.1 Consider repair for people with an unruptured AAA if it is: • Symptomatic • Asymptomatic, larger than 4.0 cm and has grown by more than 1 cm in 1 year (measured inner to inner maximum anterior-posterior aortic diameter on ultrasound) • Asymptomatic and 5.5 cm or larger on ultrasound (measured inner to inner maximum anterior-posterior aortic diameter on ultrasound)
	1.5.2 When discussing AAA repair with people who have an unruptured AAA, explain the overall balance of benefits and risks with repair and with no repair, based on their current health and their expected future health. Cover the: • Short and long term risks and other disadvantages of repair (such as having to stay in hospital, the risks of the operation, the recovery period, the potential need for further procedures, and the need for surveillance imaging appointments) • Long term benefits of repair, taking into account the person's health and any other conditions they have • Risk of AAA rupture if they do not have repair • Uncertainties around estimates of rupture risk of AAA larger than 5.5 cm
Standard EVAR in patients suitable for OSR	1.5.3 For people with unruptured AAA meeting the criteria in 1.5.1, offer OSR unless it is contraindicated because of their anaesthetic and/or medical comorbidity
	1.5.5 Do not offer standard EVAR to people if OSR is suitable for them
Standard EVAR in patients for whom OSR is not suitable because of comorbidity	1.5.4 Offer best medical therapy with no AAA repair to people with unruptured AAA meeting the criteria in 1.5.1 but for whom OSR is unsuitable because of their anaesthetic and/or medical comorbidity
	1.5.7 Be aware that for people with unruptured AAA in whom OSR is unsuitable because of their anaesthetic and/or medical comorbidity: • There is evidence that for many people standard EVAR is neither clinically effective nor cost effective. • There are no clinical, biochemical or imaging features or risk prediction models which can be used to identify: • Who will benefit from or be harmed by standard EVAR • For whom standard EVAR will be cost effective
	1.5.8 In people for whom OSR is unsuitable because of their anaesthetic and/or comorbidity only consider standard EVAR where all of the evidence statements in 1.5.7 have been discussed with the person.
Complex EVAR in people for whom OSR is suitable	1.5.9 If OSR and complex EVAR are both suitable options, only consider complex EVAR where: • The following has been discussed with the person: • The risks of complex EVAR (including the potential need for further procedures and the need for lifelong monitoring), compared with the risks of OSR • The lack of evidence for improved peri-operative survival with complex EVAR, compared with OSR • The lack of evidence about long term outcome of complex EVAR compared with OSR • The reduced time spent in hospital for people who have complex EVAR, compared with OSR Complex EVAR, if performed, should only be performed within a randomised controlled trial comparing the clinical and cost effectiveness of complex EVAR with OSR, or with delayed (or no) intervention
Complex EVAR in people for whom OSR is unsuitable because of comorbidity	1.5.10 Be aware that, if OSR is not suitable for a person because of their medical and/or anaesthetic comorbidities: • There is no evidence to support how to identify subgroups of people who would benefit or be harmed by complex EVAR compared with no intervention • There is no evidence to support how to identify subgroups of people for whom complex EVAR would be cost effective, compared with no intervention • It is unlikely that there are any subgroups who would benefit from complex EVAR • It is unlikely that complex EVAR is cost effective compared with no intervention

Рекомендации NICE и GDC

- 1.5.1 Рассмотреть операцию у больных с неразорванной АБА если:
  - Симптомная
  - Асимптомная и больше 5.5 см
  - Асимптомная 4.0 см с прогрессией 1.0 см за год

Рекомендации NICE и GDC

- 1.5.3 Для больных, подпадающих под критерии 1.5.1 предлагать OSR, если нет противопоказаний
- 1.5.5 Не предлагать EVAR если возможна OSR
- 1.5.4 Предлагать OMT, если OSR невозможна

Рекомендации NICE и GDC

- 1.5.7 Учитывать что:
- Доказано, что TEVAR не имеет клинических и финансовых преимуществ
- Не существует клинических, биохимических или лучевых признаков для определения:
  - Кто выиграет от EVAR
  - Для кого EVAR сэкономит средства

Рекомендации NICE и GDC

- 1.5.8 Для больных, у которых OSR невозможна из-за сопутствующих рисков, следует обсудить утверждения из пункта 1.5.7

На каком основании базируются эти выводы?

- Исследование EVAR-1!!!

WTF?

NICEXIT?

The GDC believed that although its recommendations would result in an increase in OSR and critical care bed usage, they would lead to an overall reduction in NHS resource utilisation for AAA because of a larger decrease in EVAR. The GDC noted the continuing declining prevalence

Уменьшение количества EVAR позволит высвободить средства, которые можно направить на лечение других заболеваний.

Выводы

- Анализ литературы демонстрирует сопоставимость результатов OSR и EVAR
- Эти данные распространяются на все возрастные и гендерные группы
- У больных высокого хирургического риска имеются преимущества EVAR

Выводы

- Выбор метода лечения основывается на технических возможностях оперирующих бригад
- Финансовый фактор может иметь значение

Аневризмы грудной аорты: TEVAR vs OSR

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY VOL. 73, NO. 6, 2019

PUBLISHED BY ELSEVIER

Endovascular Versus Open Repair of Intact Descending Thoracic Aortic Aneurysms

Peter Chiu, MD,[a,b] Andrew B. Goldstone, MD, PhD,[a,b] Justin M. Schaffer, MD,[c] Bharathi Lingala, PhD,[a] D. Craig Miller, MD,[a] R. Scott Mitchell, MD,[a] Y. Joseph Woo, MD,[a] Michael P. Fischbein, MD, PhD,[a] Michael D. Dake, MD[a]

База Medicare. 3805 больных

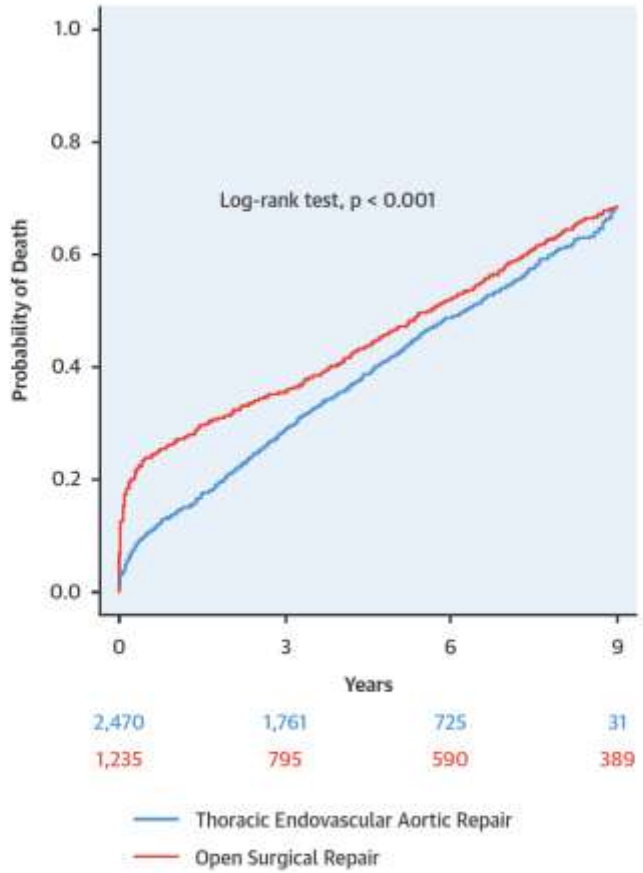
Выживаемость

TABLE 2 Early Death, Late Death, and Midterm Survival

	Open Surgical Repair	TEVAR	p Value
Mortality at 180 days, % (95% CI)	23.8 (21.4 to 26.1)	10.2 (9.0 to 11.4)	
Low-volume open surgical center, % (95% CI)	29.3 (25.6 to 32.8)		
High-volume open surgical center, % (95% CI)	18.2 (15.1 to 21.2)		
Mortality at 5 yrs, % (95% CI)	46.7 (43.9 to 49.4)	42.2 (40.2 to 44.1)	
Mortality at 9 yrs, % (95% CI)	68.4 (65.7 to 70.9)	68.6 (64.3 to 72.3)	
Odds of early mortality (≤180 days)			
Low-volume open surgical center, OR (95% CI)	3.62 (2.88 to 4.51)	Reference	
High-volume open surgical center, OR (95% CI)	1.97 (1.53 to 2.61)	Reference	
Hazard of late death (>180 days), HR (95% CI)	0.86 (0.77 to 0.95)	Reference	0.004
Restricted mean survival time, days	-209.2 (-298.7 to -119.7)	Reference	<0.001
Restricted mean survival time ratio	0.90 (0.86 to 0.94)	Reference	<0.001
Restricted mean time lost ratio	1.17 (1.09 to 1.25)	Reference	<0.001

Выживаемость

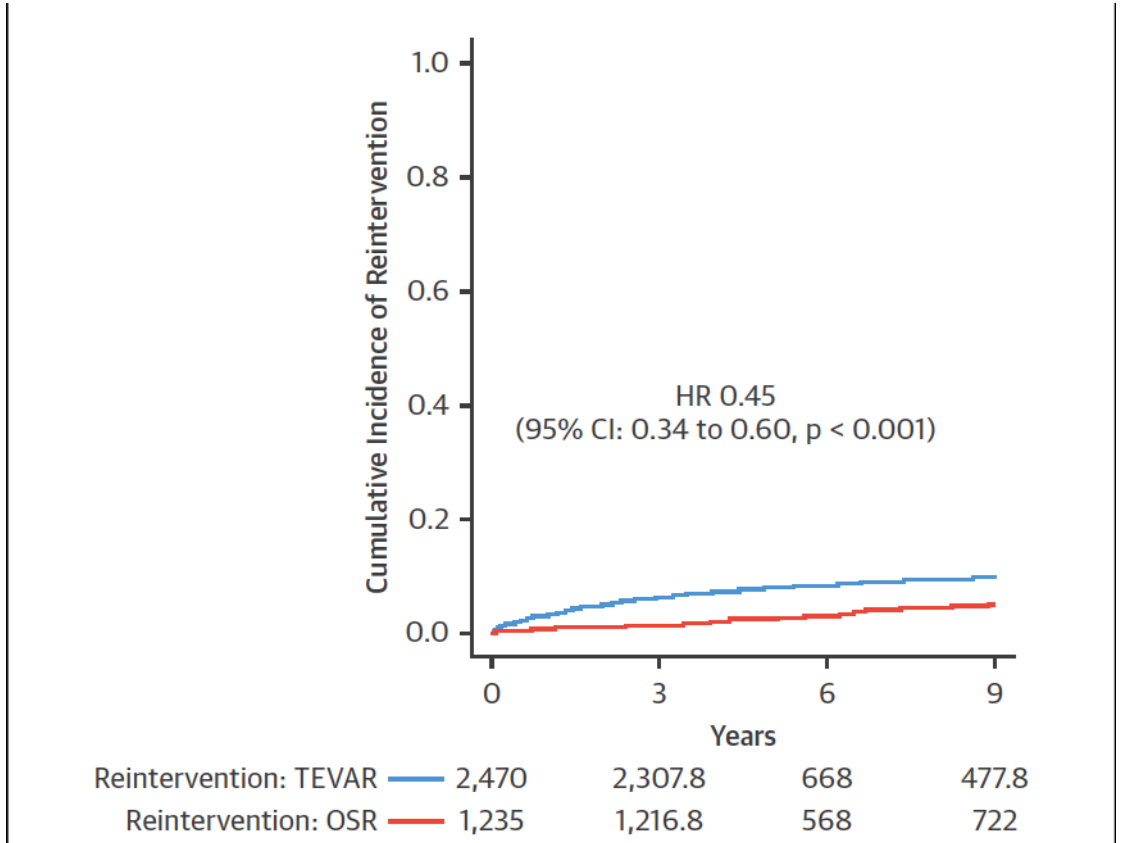
CENTRAL ILLUSTRATION Thoracic Endovascular Aortic Repair Versus Open Surgical Repair: Cumulative Incidence of Mortality



Chiu, P. et al. J Am Coll Cardiol. 2019;73(6):643–51.

The cumulative incidence of mortality was greater with open surgical repair due to increased risk of periprocedural death. Due to higher late hazard for mortality, the mortality benefit of thoracic endovascular aortic repair was eventually lost at approximately 9 years.

Реинтервенции



The subdistribution hazard for reintervention was lower for open surgical repair (OSR) compared with thoracic endovascular aortic repair (TEVAR) in the matched groups. CI = confidence interval; HR = hazard ratio; other abbreviations as in Figure 1.

Вывод

- Для бенефициаров MEDICARE TEVAR является методом первого выбора

Son et al. BMC Surg (2020) 20:266
https://doi.org/10.1186/s12893-020-00923-4

BMC Surgery

RESEARCH ARTICLE Open Access

Long-term outcomes of intervention between open repair and endovascular aortic repair for descending aortic pathologies: a propensity-matched analysis

Shin-Ah Son[1], Hanna Jung[2] and Joon Yong Cho[2*]

230 больных. Январь 2002 – декабрь 2017

Смерть от всех причин и аорто-ассоциированная

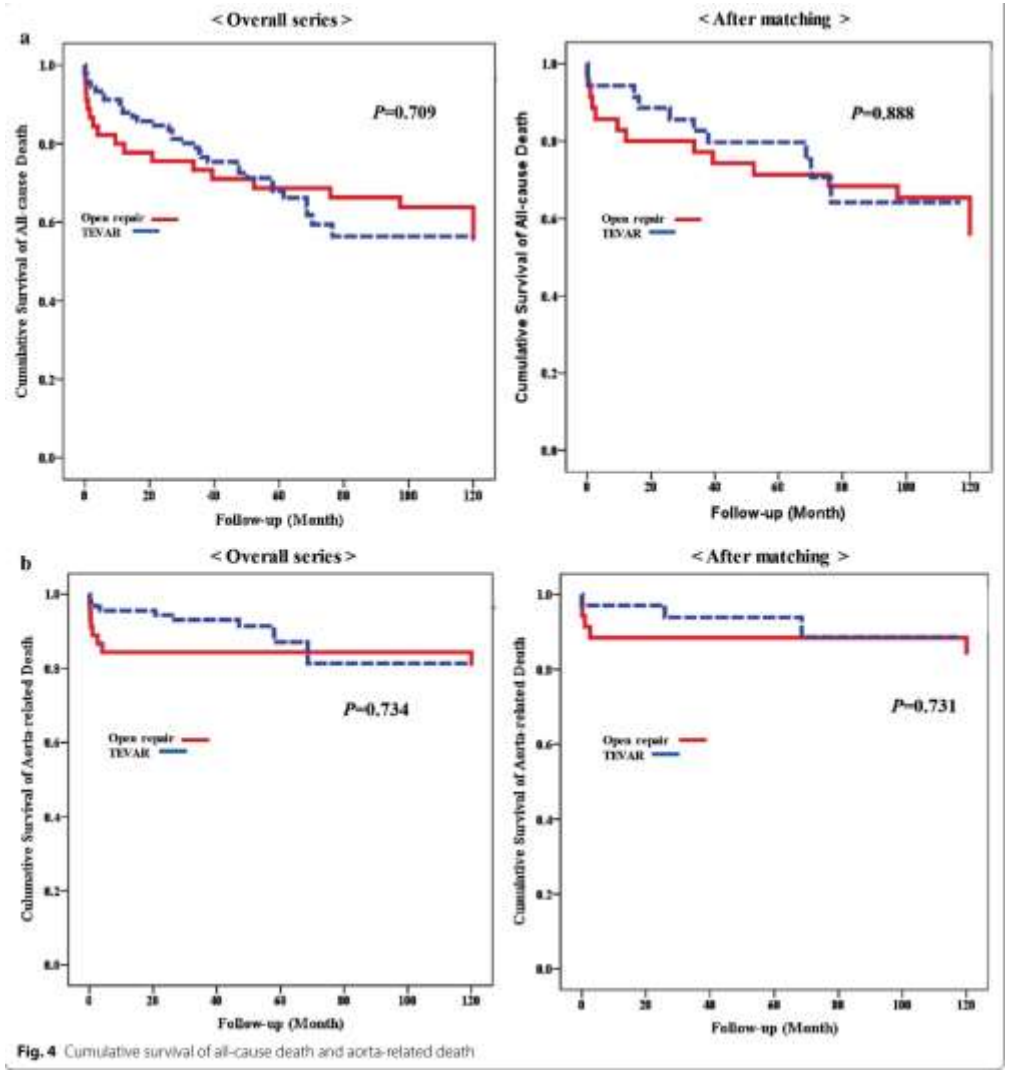


Fig. 4 Cumulative survival of all-cause death and aorta-related death

Реинтервенции

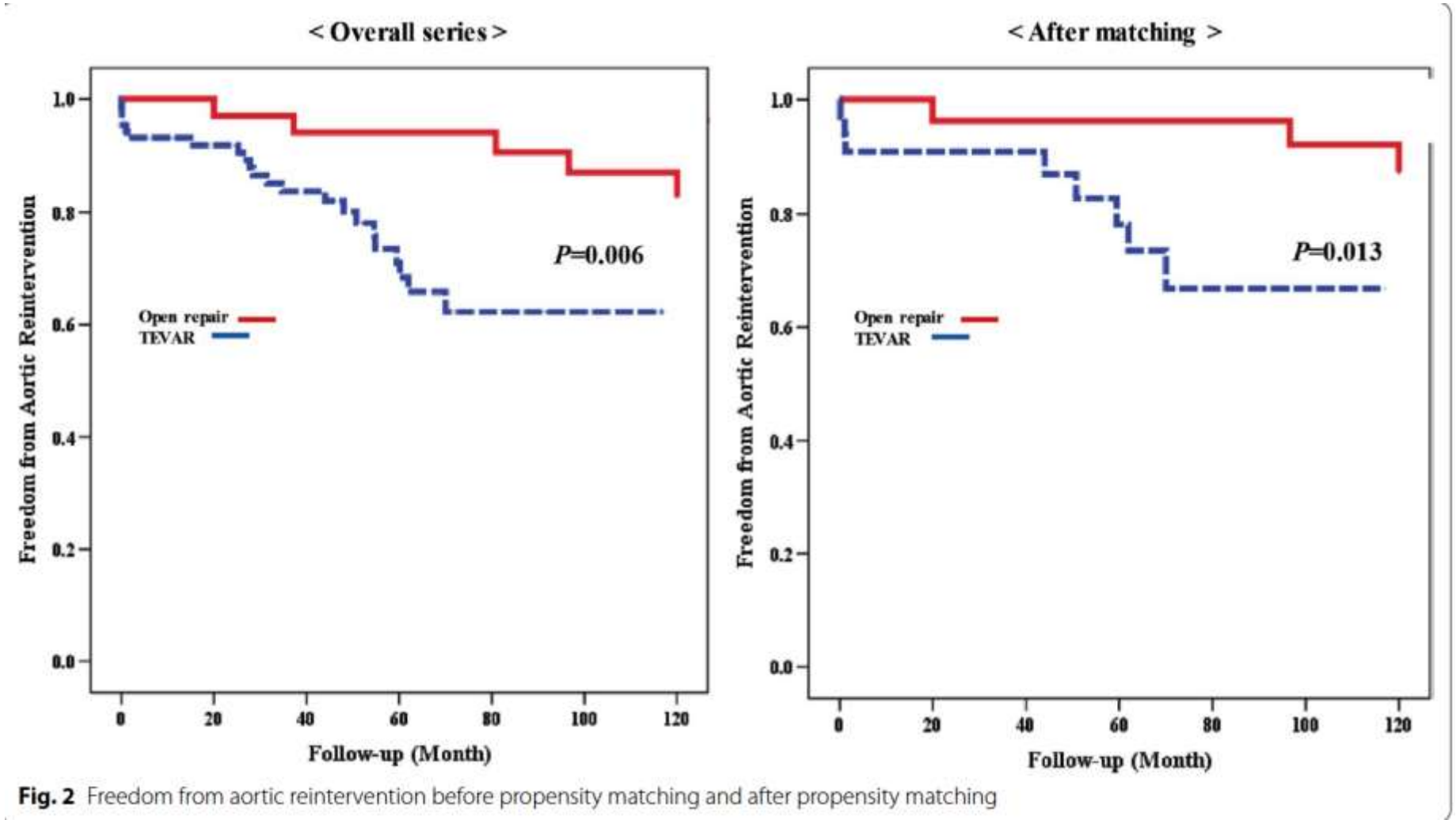


Fig. 2 Freedom from aortic reintervention before propensity matching and after propensity matching

Изменение диаметра аорты

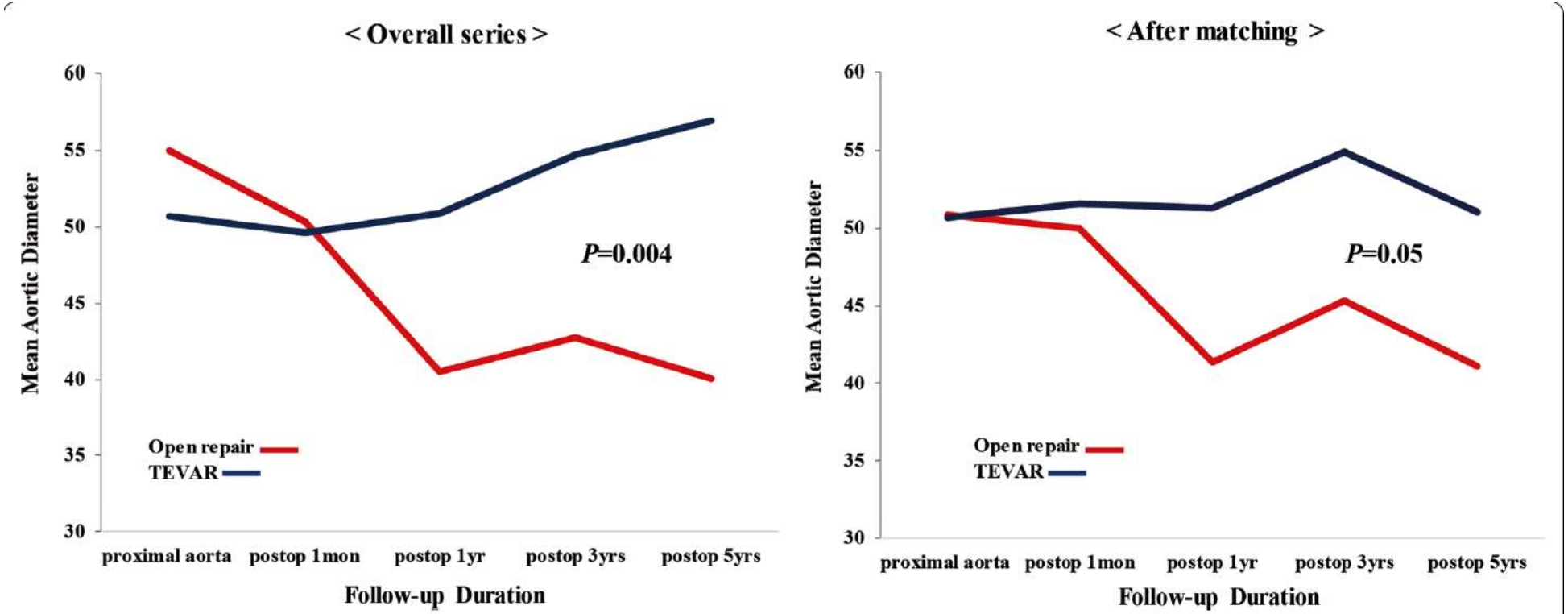


Fig. 3 Changes in aortic diameters over time before propensity matching and after propensity matching

Выводы

- Отдалённые клинические результаты не отличаются
- Ближайшие результаты лучше при TEVAR
- При TEVAR больше реинтервенций

JAMA Network | Open™

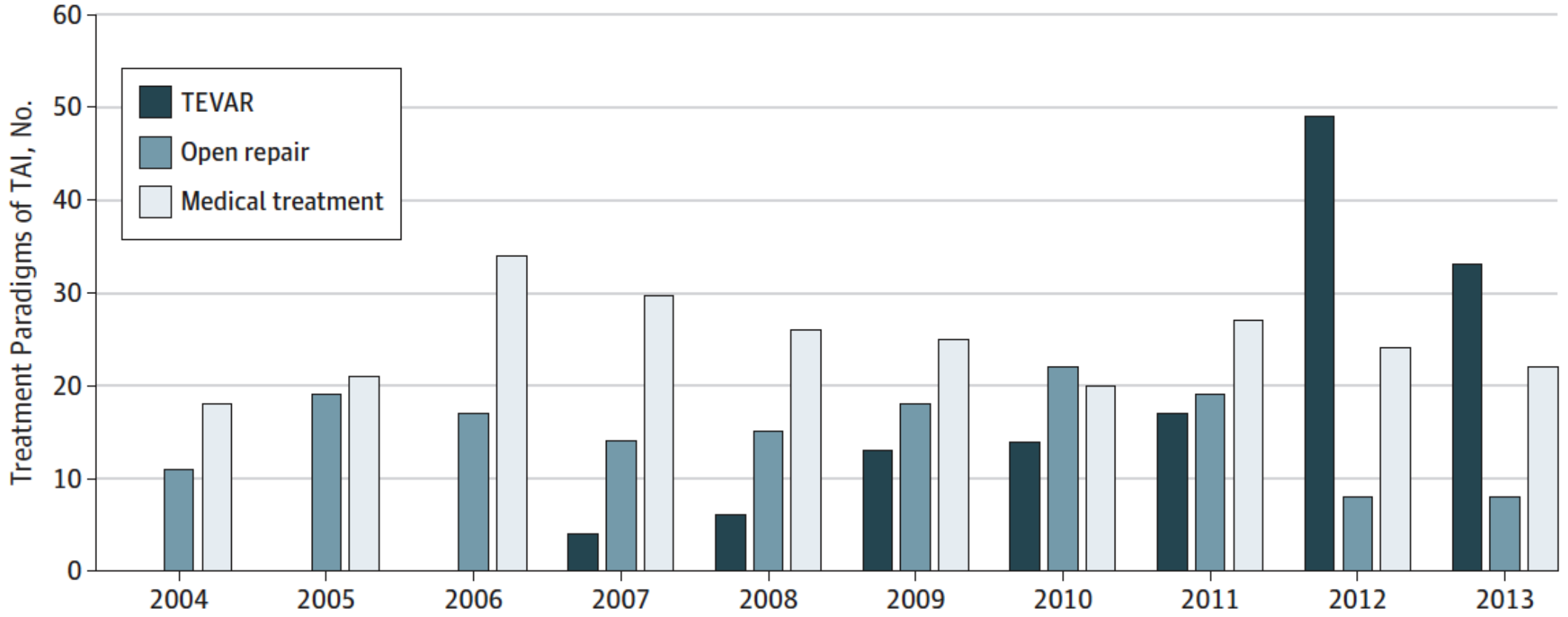
Original Investigation | Surgery

Long-term Outcomes of Endovascular and Open Repair for Traumatic Thoracic Aortic Injury

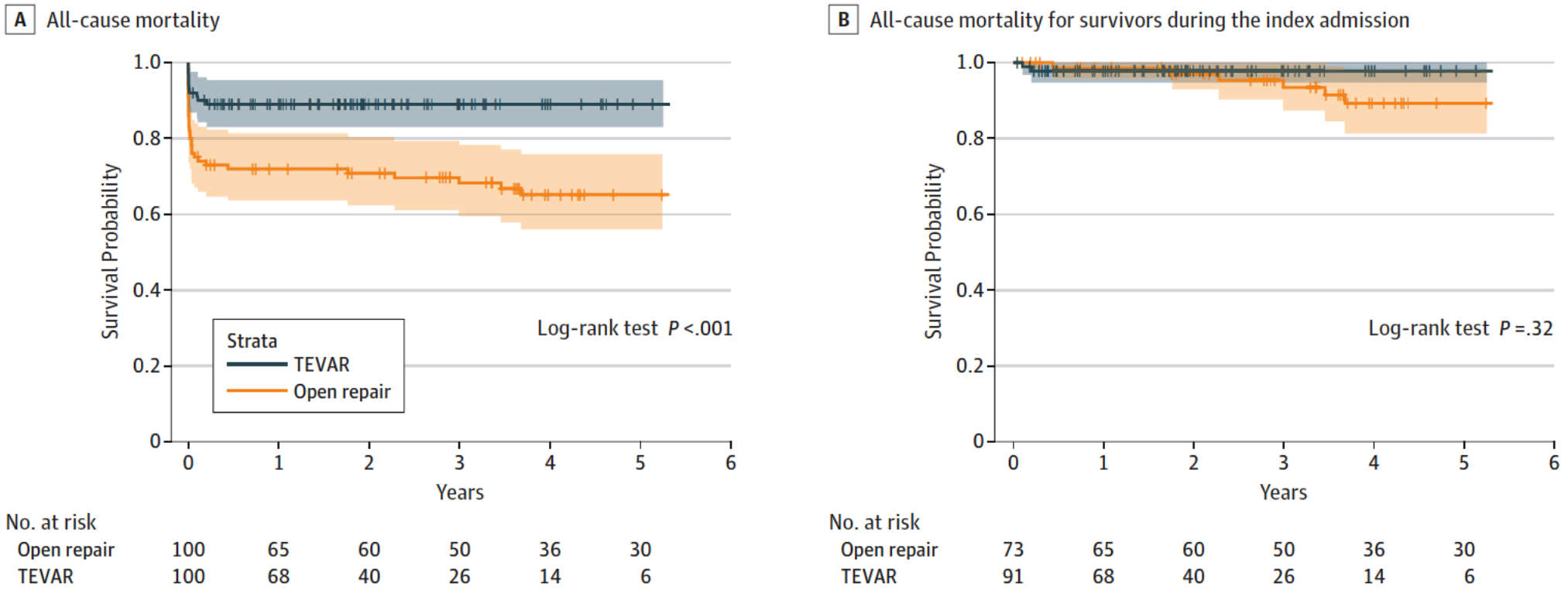
Yu-Ting Cheng, MD; Chi-Tung Cheng, MD; Shang-Yu Wang, MD; Victor Chien-Chia Wu, MD; Pao-Hsien Chu, MD, FESC; An-Hsun Chou, MD, PhD; Ching-Chang Chen, MD; Po-Jen Ko, MD; Kuo-Sheng Liu, MD, PHD; Shao-Wei Chen, MD

Тайваньская национальная база данных.
287 больных. 2004-2013 гг.

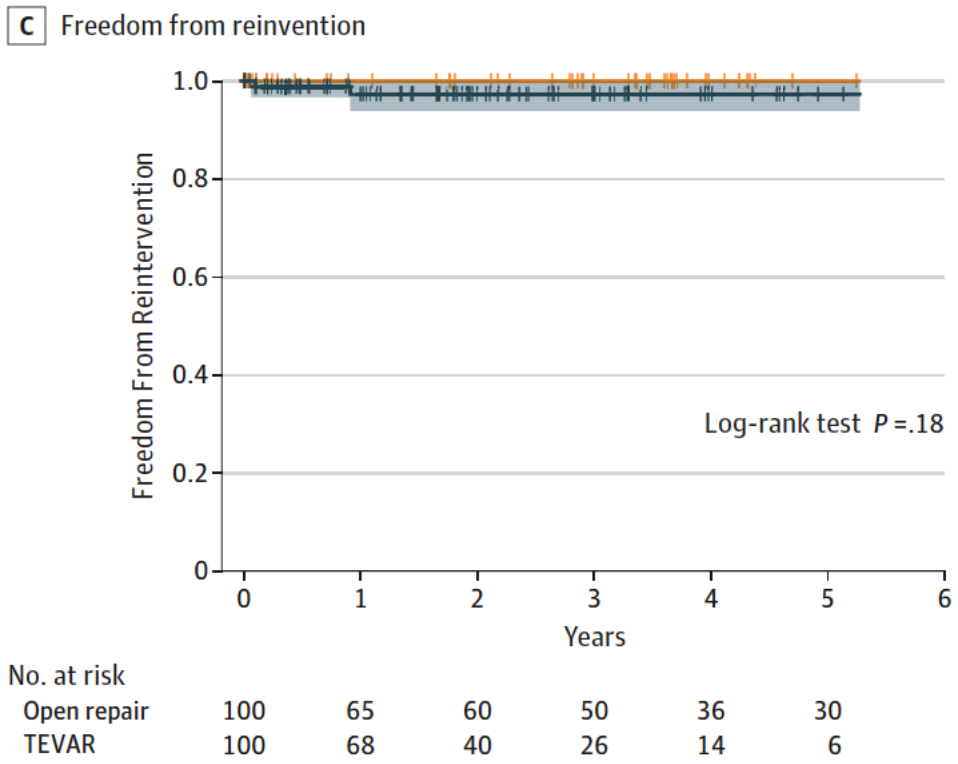
Изменение парадигмы 2004-2013гг.

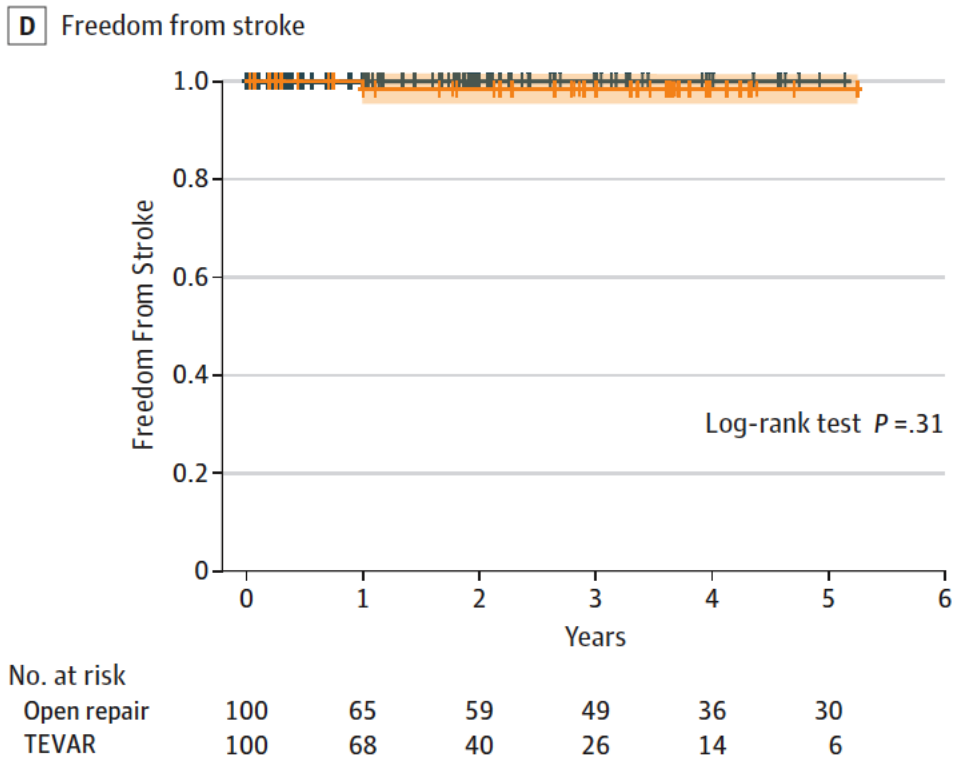


Смерть от всех причин



Реинтервенции и ОНМК





Выводы

- Преимущество TEVAR по отдалённым результатам, в основном за счёт лучшей выживаемости в госпитальном периоде
- Одинаковый уровень реинтервенций
- TEVAR – метод выбора

Диссекции аорты

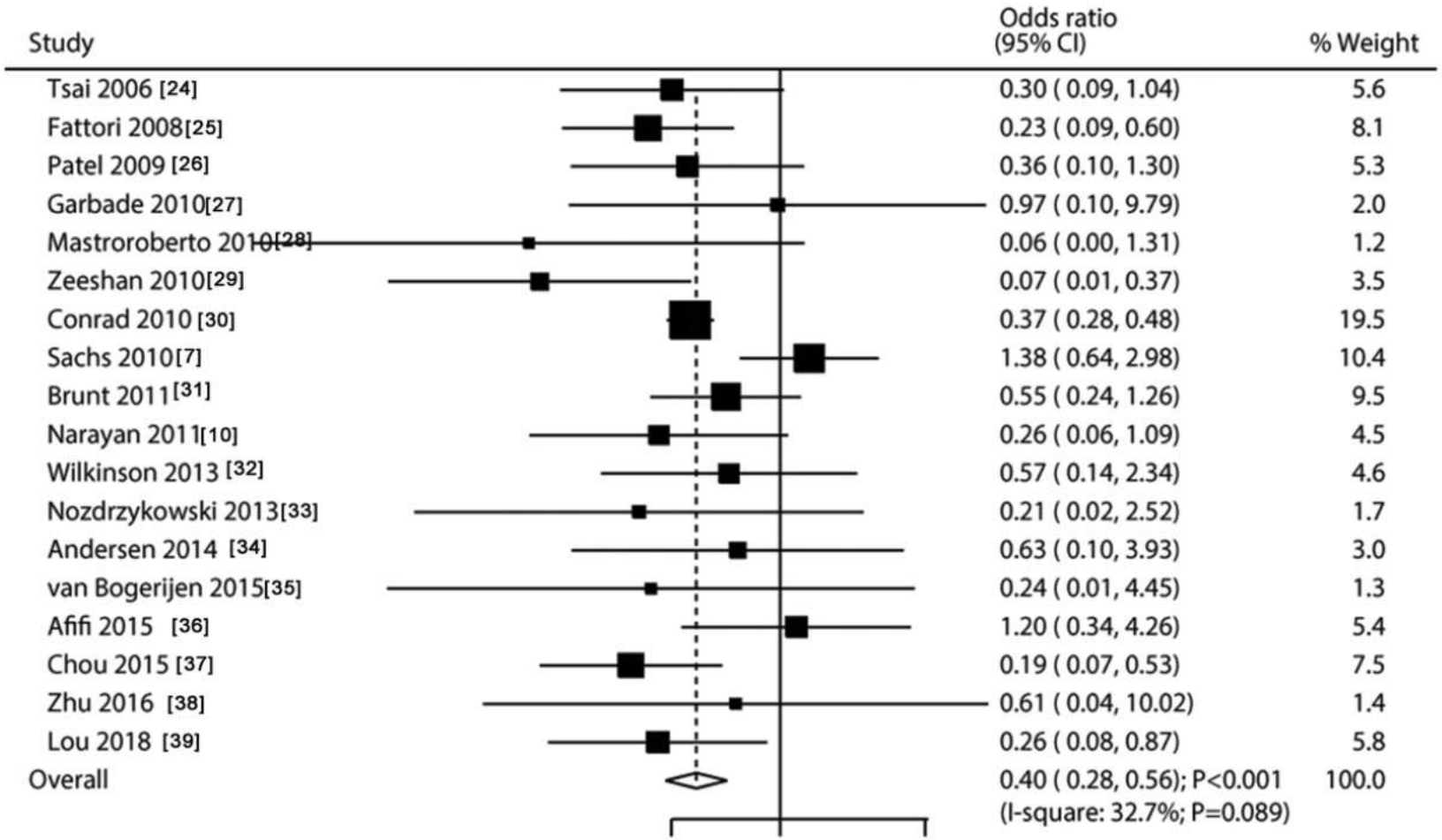
Thoracic endovascular aortic repair versus open chest surgical repair for patients with type B aortic dissection: a systematic review and meta-analysis

Jianping Liu, Juan Xia, Gaowu Yan, Yongheng Zhang, Jing Ge & Lin Cao

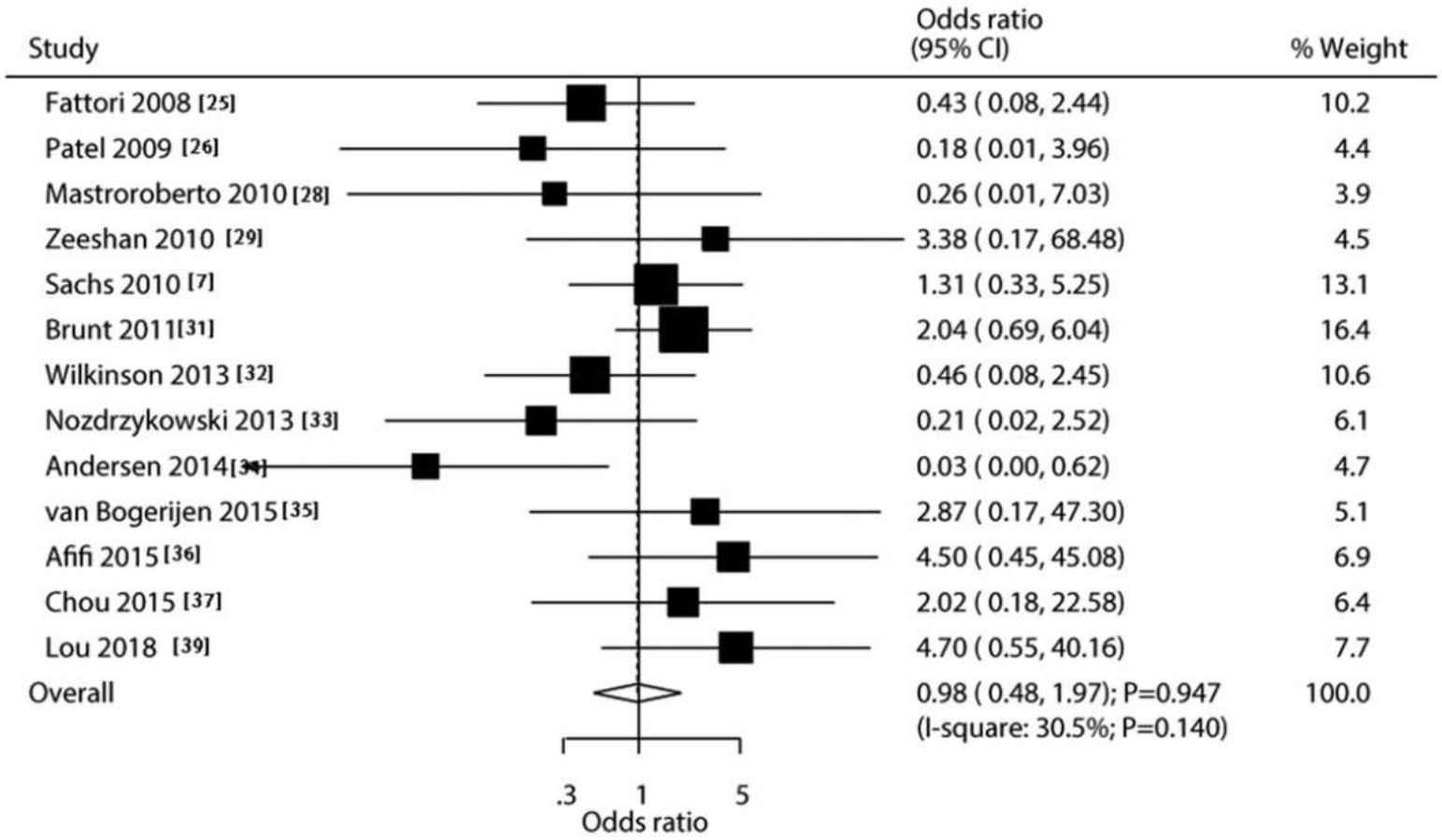
To cite this article: Jianping Liu, Juan Xia, Gaowu Yan, Yongheng Zhang, Jing Ge & Lin Cao (2019) Thoracic endovascular aortic repair versus open chest surgical repair for patients with type B aortic dissection: a systematic review and meta-analysis, Annals of Medicine, 51:7-8, 360-370, DOI: 10.1080/07853890.2019.1679874

Мета-анализ. 18 исследований, 9 664 больных с диссекцией аорты.

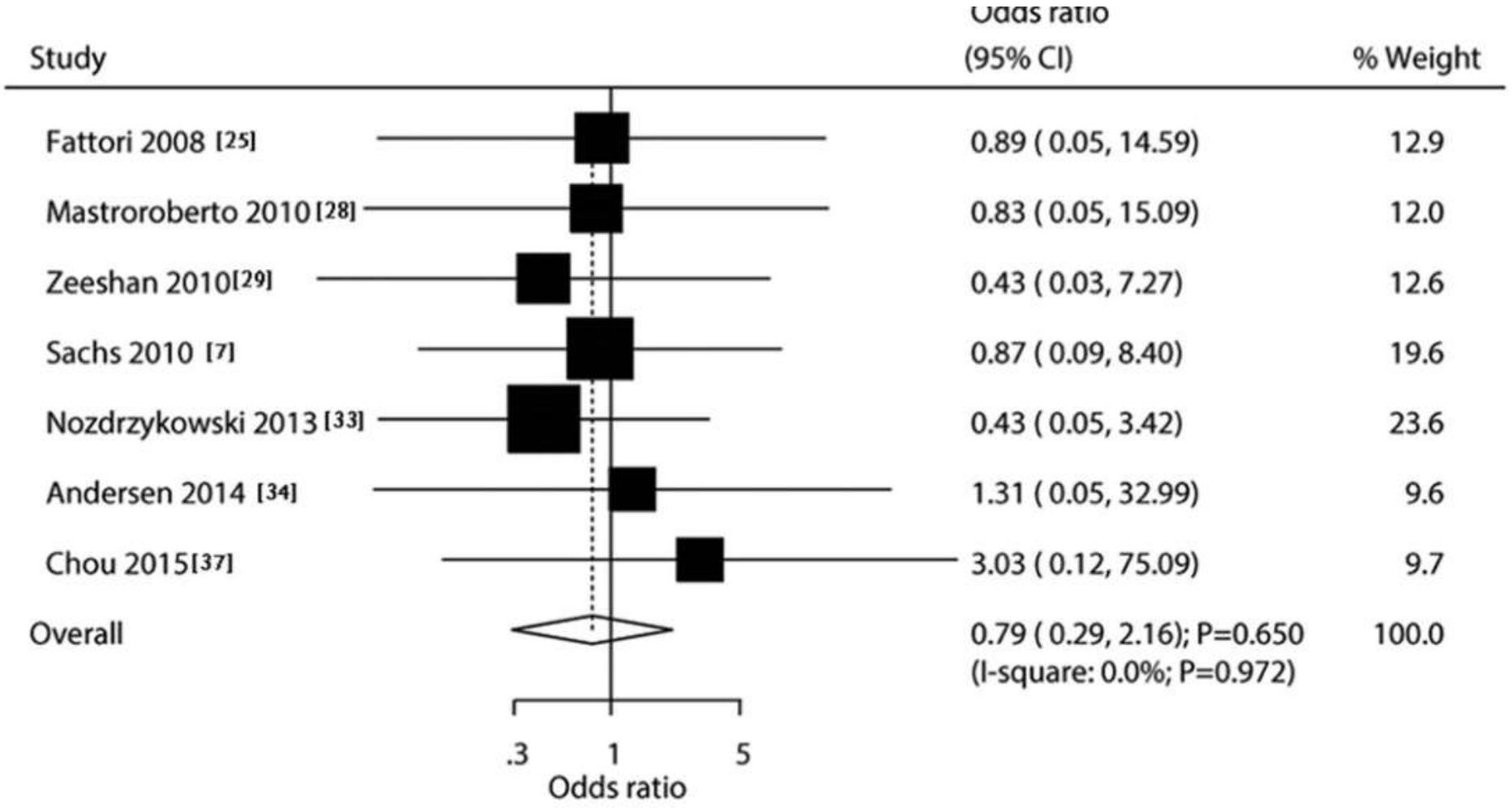
Госпитальная летальность



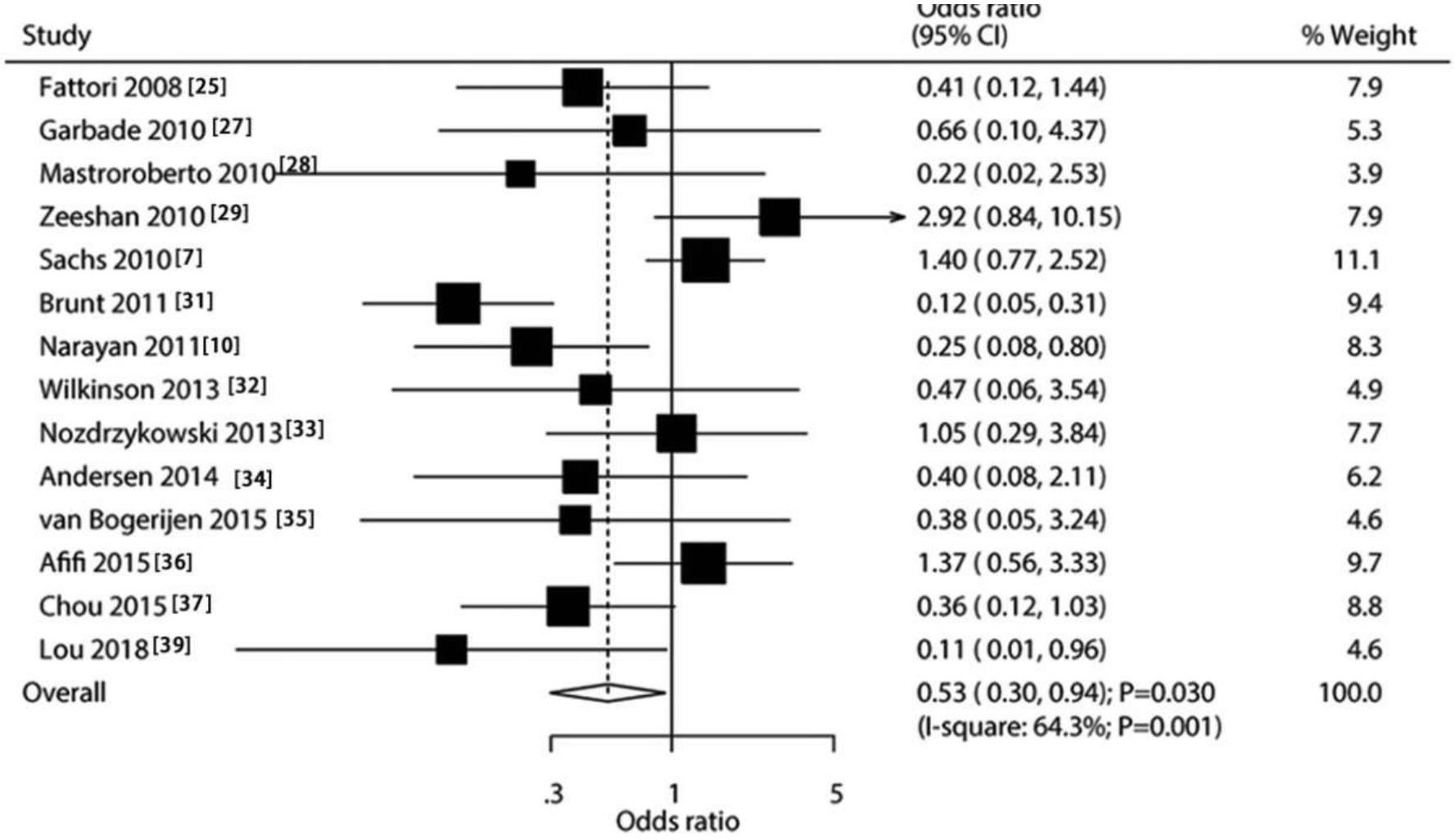
ОНМК


Study
Odds ratio (95% CI)
% Weight
Fattori 2008 [25]
0.43 (0.08, 2.44)
10.2
Patel 2009 [26]
0.18 (0.01, 3.96)
4.4
Mastroroberto 2010 [28]
0.26 (0.01, 7.03)
3.9
Zeeshan 2010 [29]
3.38 (0.17, 68.48)
4.5
Sachs 2010 [7]
1.31 (0.33, 5.25)
13.1
Brunt 2011 [31]
2.04 (0.69, 6.04)
16.4
Wilkinson 2013 [32]
0.46 (0.08, 2.45)
10.6
Nozdrzykowski 2013 [33]
0.21 (0.02, 2.52)
6.1
Andersen 2014 [34]
0.03 (0.00, 0.62)
4.7
van Bogerijen 2015 [35]
2.87 (0.17, 47.30)
5.1
Afifi 2015 [36]
4.50 (0.45, 45.08)
6.9
Chou 2015 [37]
2.02 (0.18, 22.58)
6.4
Lou 2018 [39]
4.70 (0.55, 40.16)
7.7
Overall
0.98 (0.48, 1.97); P=0.947
(I-square: 30.5%; P=0.140)
100.0
.3
1
5
Odds ratio

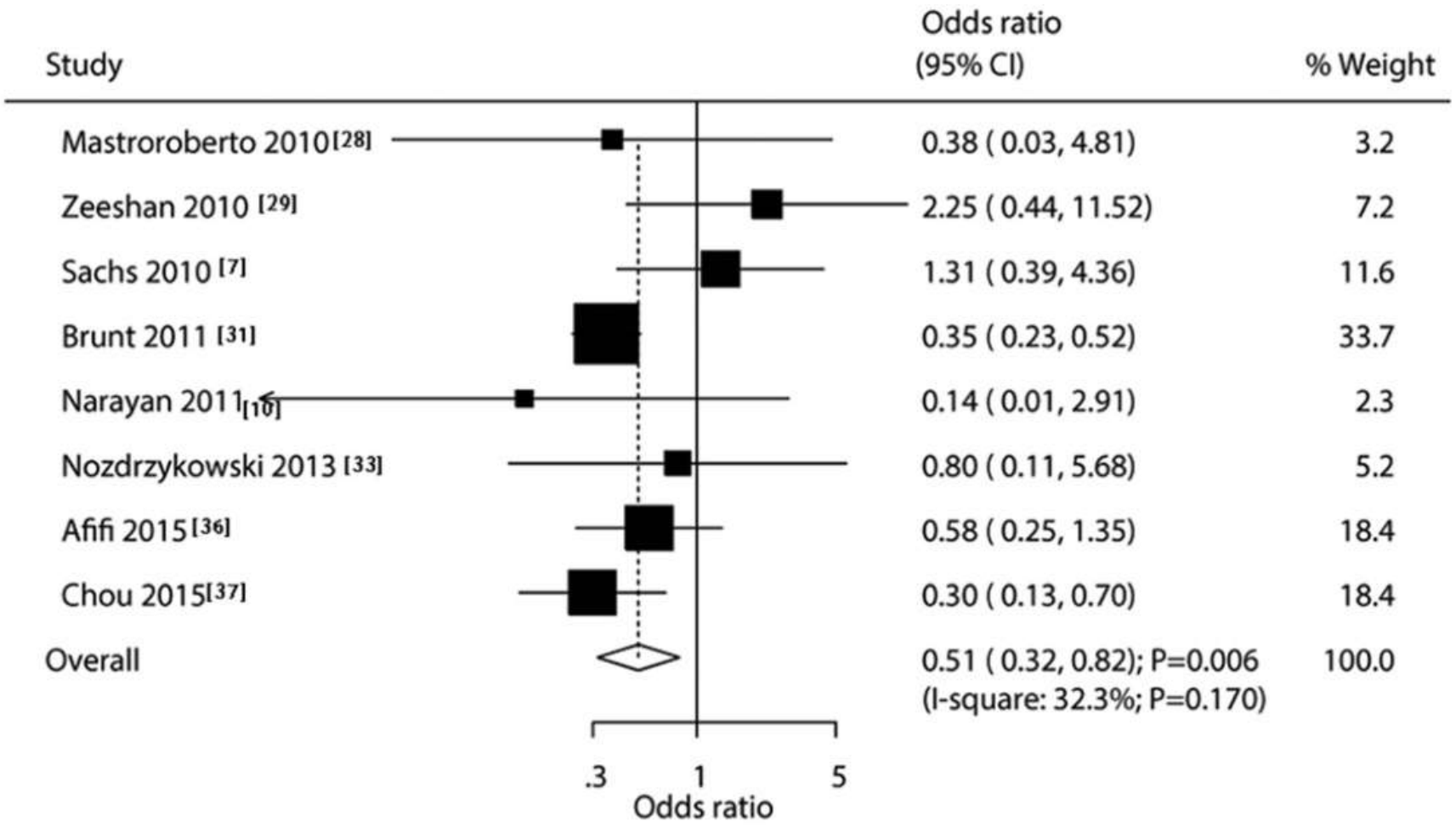
Инфаркт миокарда



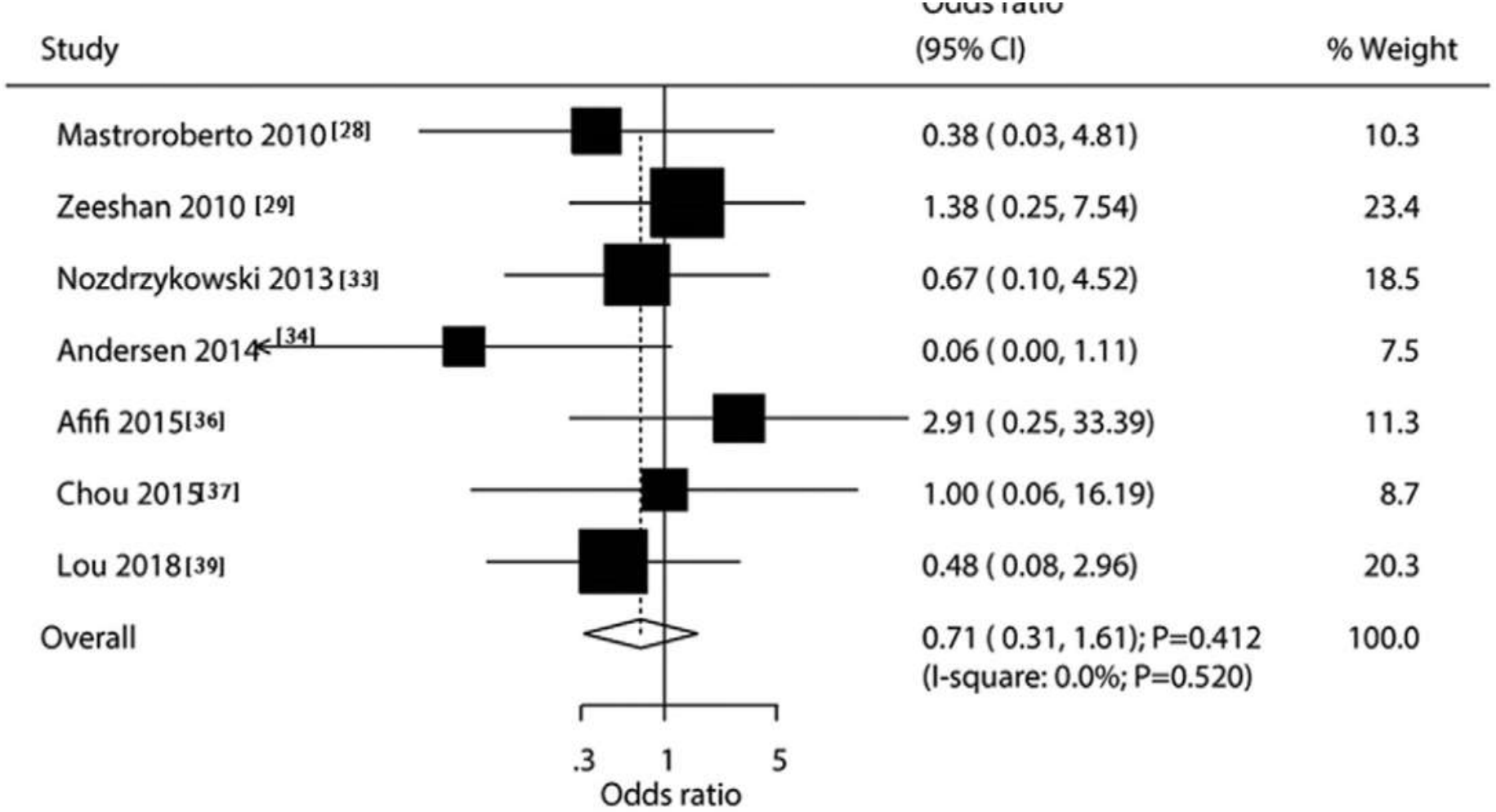
Острая почечная недостаточность



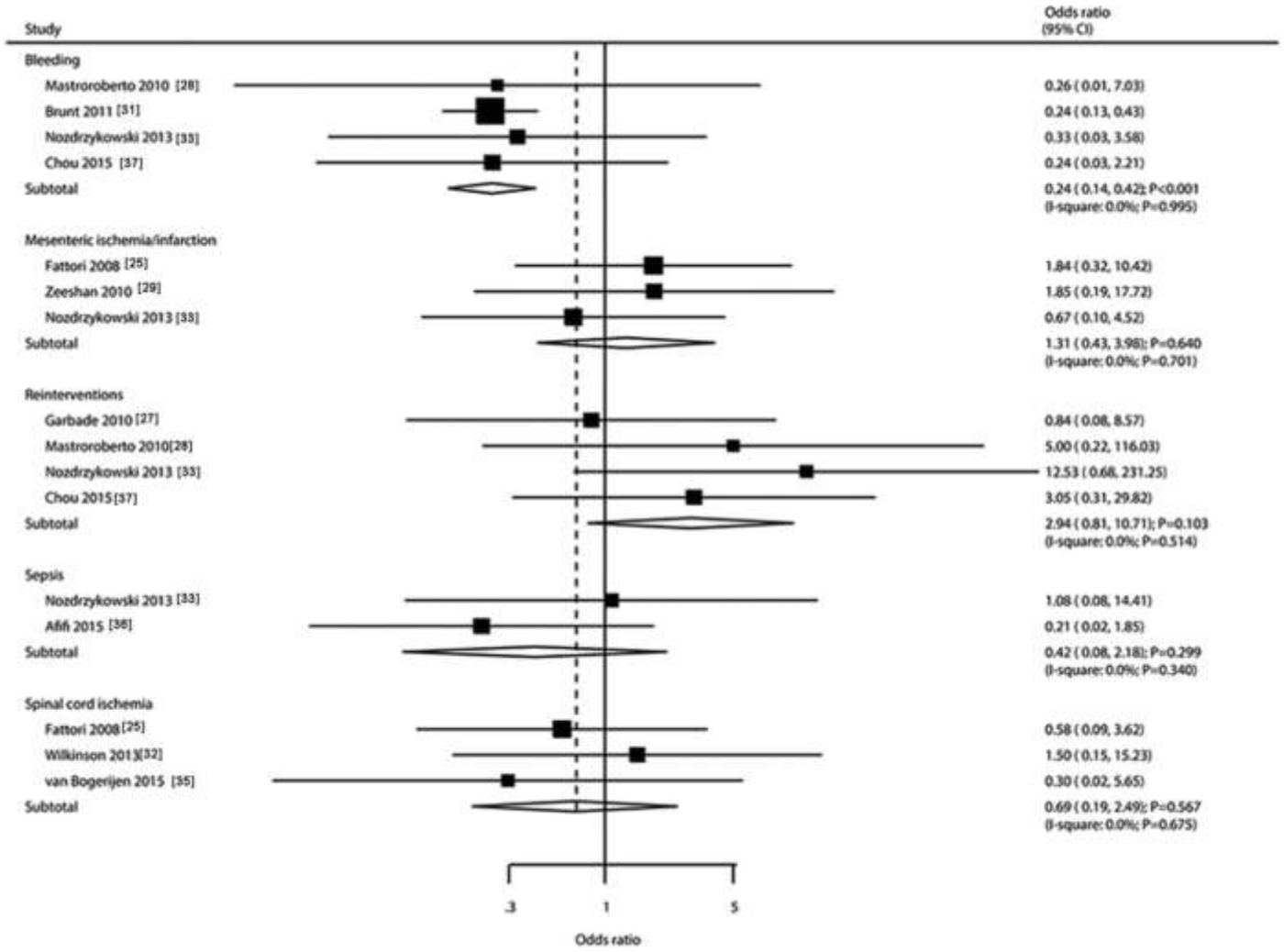
Дыхательная недостаточность



Параплегия


Study
Odds ratio
(95% CI)
% Weight
Mastroroberto 2010 [28]
0.38 (0.03, 4.81)
10.3
Zeeshan 2010 [29]
1.38 (0.25, 7.54)
23.4
Nozdrzykowski 2013 [33]
0.67 (0.10, 4.52)
18.5
Andersen 2014 [34]
0.06 (0.00, 1.11)
7.5
Afifi 2015 [36]
2.91 (0.25, 33.39)
11.3
Chou 2015 [37]
1.00 (0.06, 16.19)
8.7
Lou 2018 [39]
0.48 (0.08, 2.96)
20.3
Overall
0.71 (0.31, 1.61); P=0.412
(I-square: 0.0%; P=0.520)
100.0
.3
1
5
Odds ratio

Кровотечения, мезентериальная ишемия, реинтервенции, сепсис, спинальная ишемия



Выводы

- TEVAR уменьшает риск госпитальной летальности, дыхательной недостаточности, кровотечений
- Необходимы дополнительные исследования

Long-term Results of Thoracic Endovascular Aortic Repair for Type B Aortic Dissection and Risk Factors for Survival

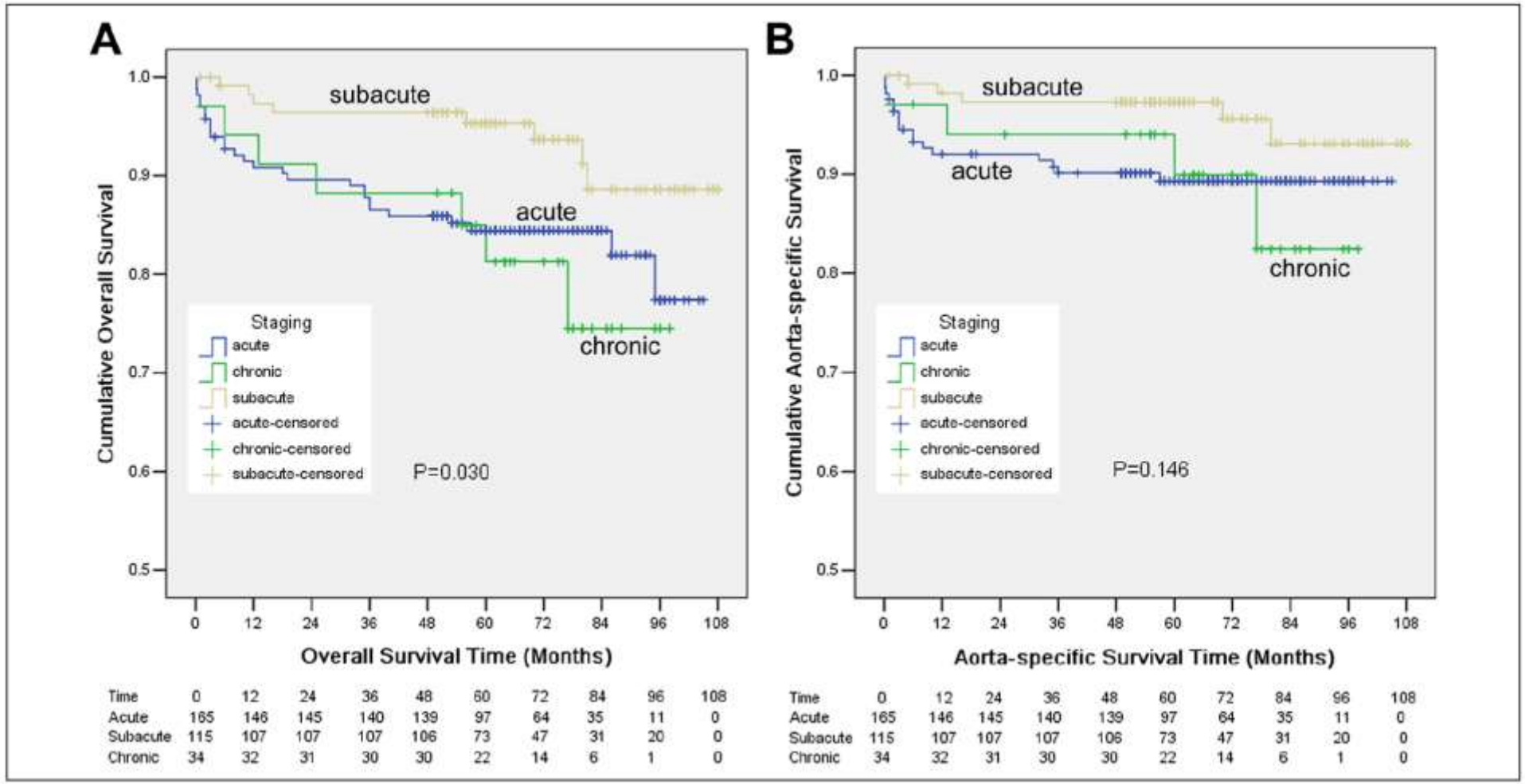
Journal of Endovascular Therapy
2020, Vol. 27(3) 358–367

DOI: 10.1177/1526602820910135
www.jevt.org
SAGE

Dong-lin Li, MD[1], Yun-jun He, MD[1], Xiao-hui Wang, MD[1], Yang-yan He, MD[1], Zi-heng Wu, MD[1], Qian-qian Zhu, MD[1], Tao Shang, MD[1], and Hong-kun Zhang, MD, PhD[1]

Одноцентровое исследование, 314 больных

Выживаемость в зависимости от стадии расслоения



Факторы, определяющие выживаемость

	Overall Survival		Aorta-Specific Survival	
	Univariable[a]	Multivariable[b]	Univariable[a]	Multivariable[b]
Age >52 years	p=0.003	2.98 (1.03 to 8.66) p=0.044	p=0.004	4.29 (0.98 to 18.78) p=0.053
Sex	p=0.935		p=0.460	
Hypertension	p=0.947		p=0.662	
Diabetes	p=0.937		p=0.438	
Smoking	p=0.422		p=0.557	
Hyperlipidemia	p=0.668		p=0.867	
Coronary artery disease	p=0.564		p=0.512	
Peripheral artery disease	p=0.632		p=0.445	
Cerebrovascular disease	p=0.516		p=0.567	
End-stage nephropathy	p=0.855		p=0.745	
COPD	p=0.601		p=0.557	
Refractory hypertension	p=0.211		p=0.245	
Intractable pain	p=0.756		p=0.424	
Visceral malperfusion	p=0.006	2.81 (1.05 to 7.48) p=0.039	p=0.162	2.13 (0.54 to 8.36) p=0.277
Leg ischemia	p=0.754		p=0.648	
True lumen collapse	p=0.218		p=0.041	1.24 (0.30 to 5.13) p=0.766
Rupture/impending rupture	p=0.861		p=0.010	2.88 (1.15 to 7.16) p=0.044
Rapid enlargement	p=0.322		p=0.456	
Aneurysmal dilatation	p=0.038	3.57 (0.99 to 12.82) p=0.051	p=0.002	8.63 (1.97 to 37.82) p=0.004
Staging[c]	p=0.042	p>0.05[c]	p=0.170	p>0.05[c]
Thoracic FL thrombosis	p=0.991		p=0.983	
Abdominal FL thrombosis	p=0.245		p=0.278	
IIIb subtype	p=0.085	1.28 (0.14 to 11.71) p=0.827	p=0.210	
Hybrid operation	p=0.483		p=0.513	
Chimney stent	p=0.335		p=0.387	
LSA coverage	p=0.295		p=0.305	
Type of stent-graft	p=0.863		p=0.874	
Reinterventions	p=0.392		p=0.465	
Endoleak	p=0.322		p=0.209	
RTAD	p=0.013	6.86 (1.47 to 31.95) p=0.014	p=0.001	14.35 (2.64 to 77.98) p=0.002
Distal erosion	p=0.053	2.37 (0.73 to 7.63) p=0.150	p=0.112	2.64 (0.65 to 10.74) p=0.174
Negative remodeling	p=0.046	1.68 (0.40 to 6.99) p=0.475	p=0.064	2.82 (0.31 to 25.59) p=0.356

Abbreviations: COPD, chronic obstructive pulmonary disease; FL, false lumen; LSA, left subclavian artery; RTAD, retrograde type A dissection.
[a]Factors with p<0.2 were entered into the multivariable model.
[b]Data are presented as the hazard ratio (95% confidence interval) p value.
[c]Includes 3 subgroups and any one of them had p>0.05.

Выводы

- Оптимальный срок интервенций – 15-90 дней
- Факторы, влияющие на выживаемость:
  - Возраст > 52 лет
  - Висцеральная малперфузия
  - Ретроградное расслоение
  - Разрыв
  - Формирование аневризмы

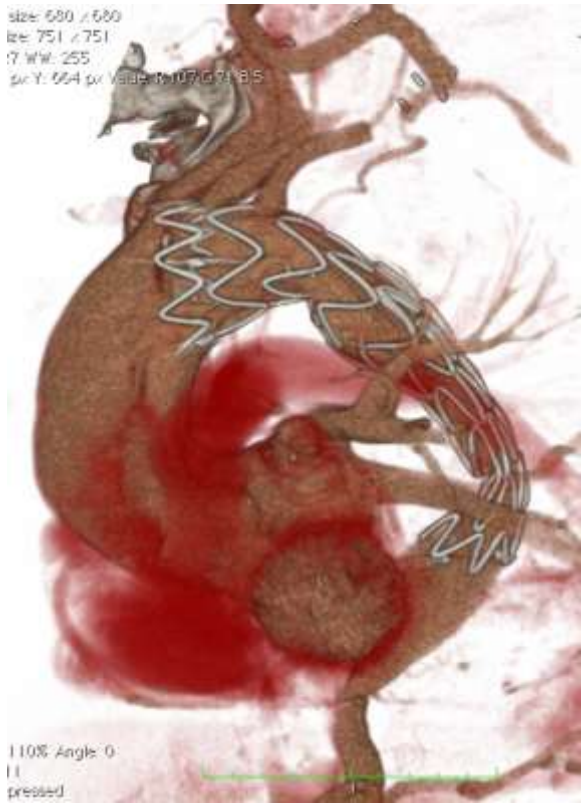
Основные проблемы TEVAR при диссекциях аорты

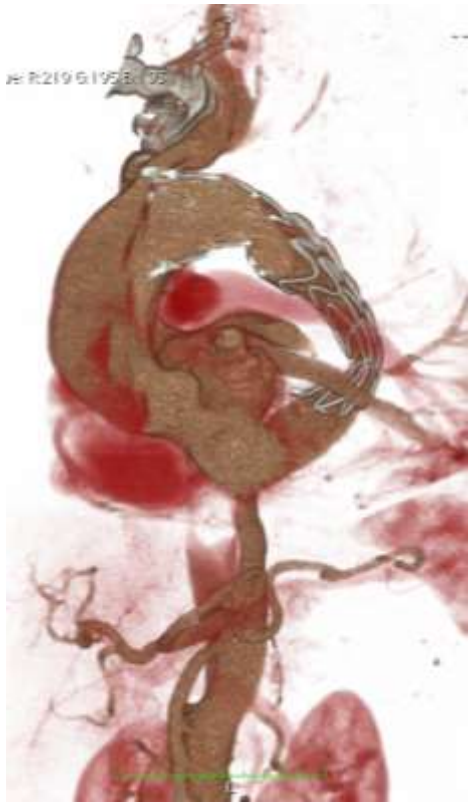
- Ретроградное расслоение
- Дистальный разрыв
- Расхождение графтов
- Нарушение целостности графта
- Разрыв аорты у больных с генетически детерминированным поражением соединительной ткани
- Аорто-медиастинальные свищи
- Отличающееся от нуля число осложнений при сонно-подключичном шунтировании

Новый термин (2014 г.): Stent Induced New Entry (SINE)

- Ретроградное расслоение – pSINE
- Дистальное расслоение - dSINE

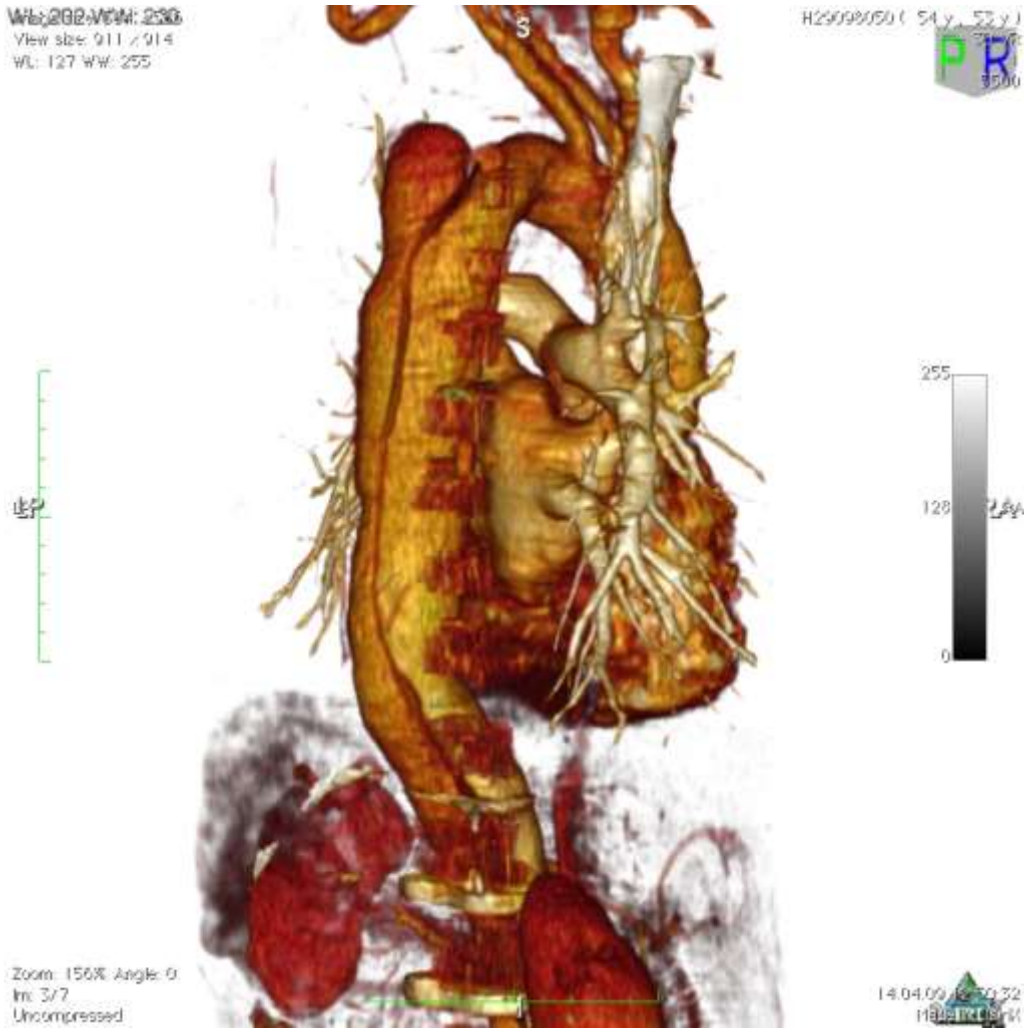
Ретроградное расслоение



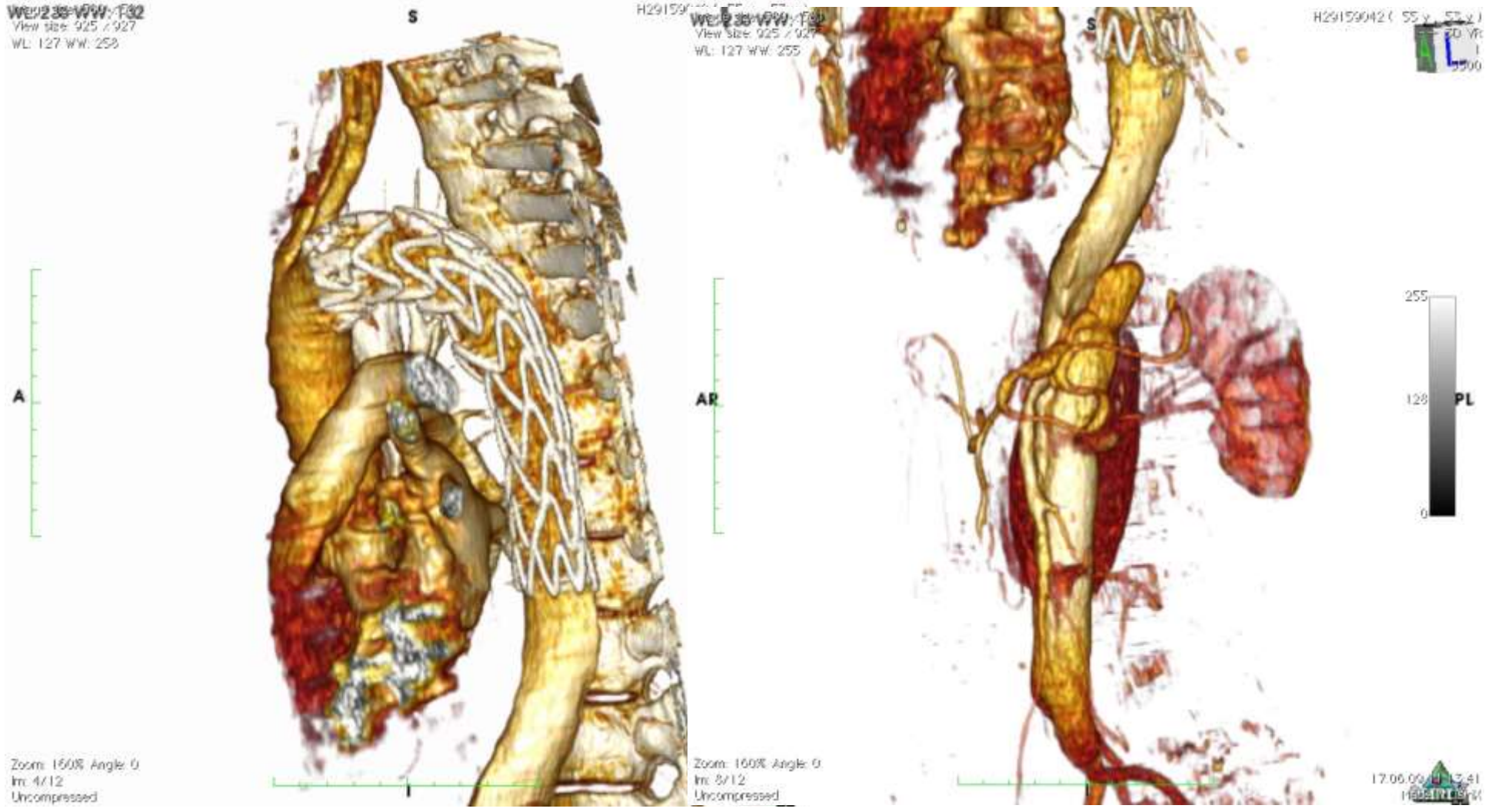


Новая проблема - dSINE

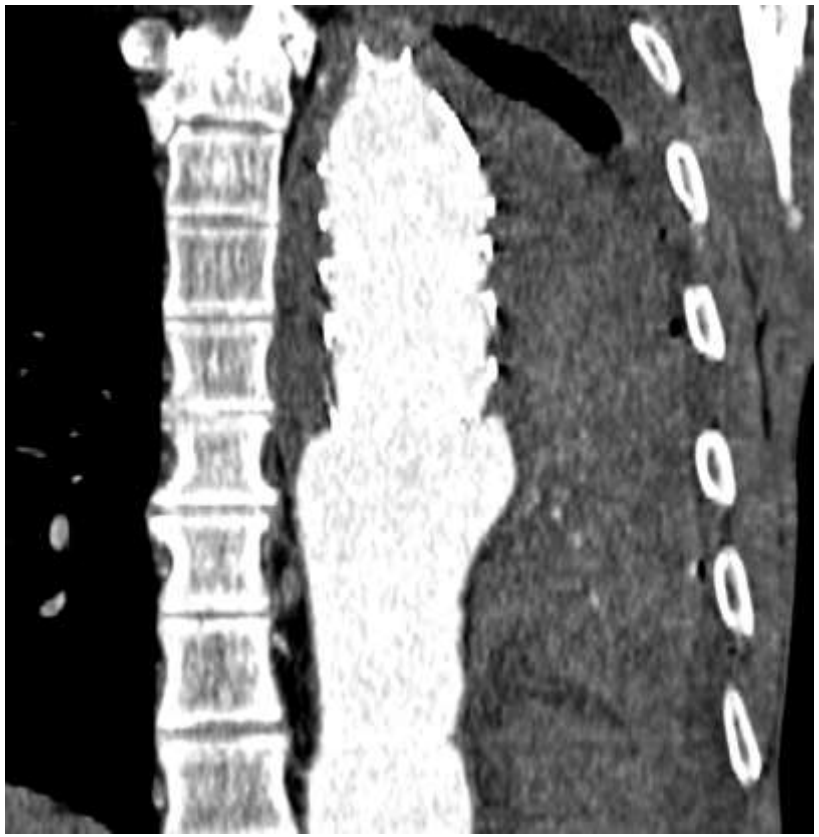
МСКТ - ангио.


View size: 911 x 914
WL: 127 WW: 255
255
128
0
Zoom: 156% Angle: 0
Im: 3/7
Uncompressed

Эндоваскулярное лечение.



DSINE через 8 лет



Дополнительные графты

И опять новые проблемы

- Расхождение графтов
- Перфорация графтов
- Разрыв аорты у больных с генетически детерминированным поражением соединительной ткани

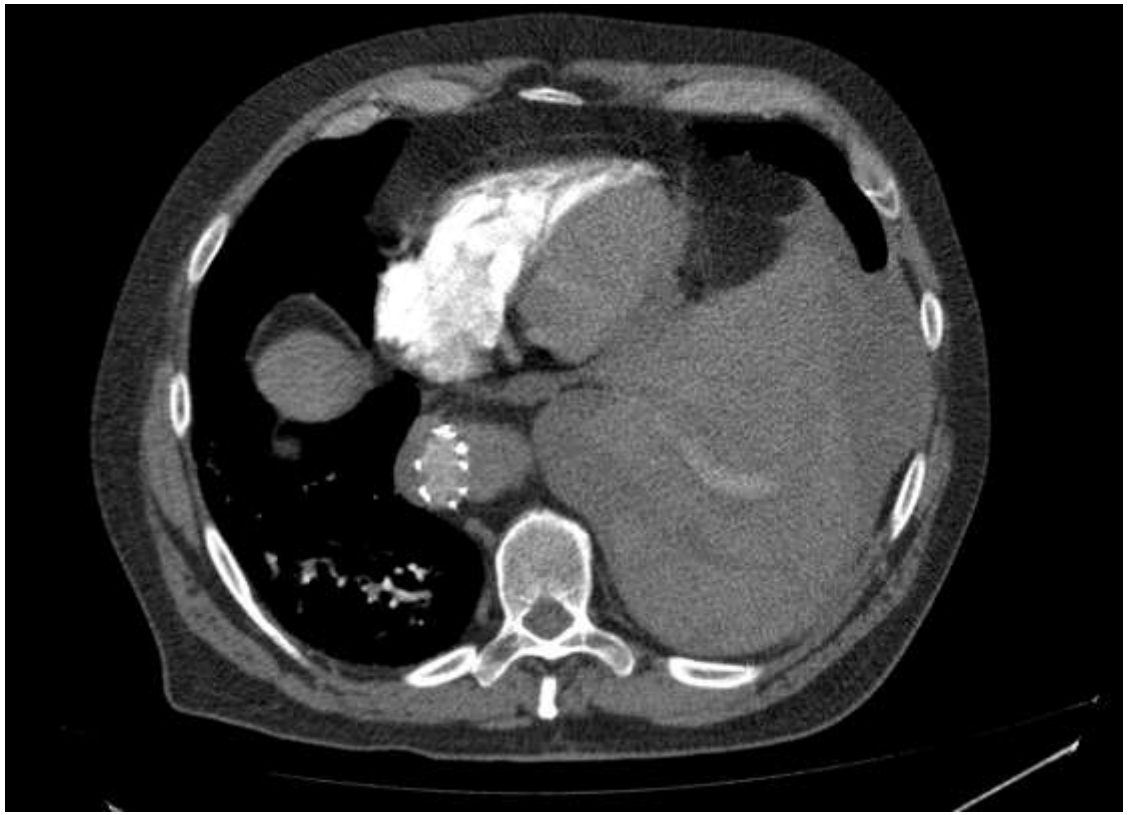
05.2016

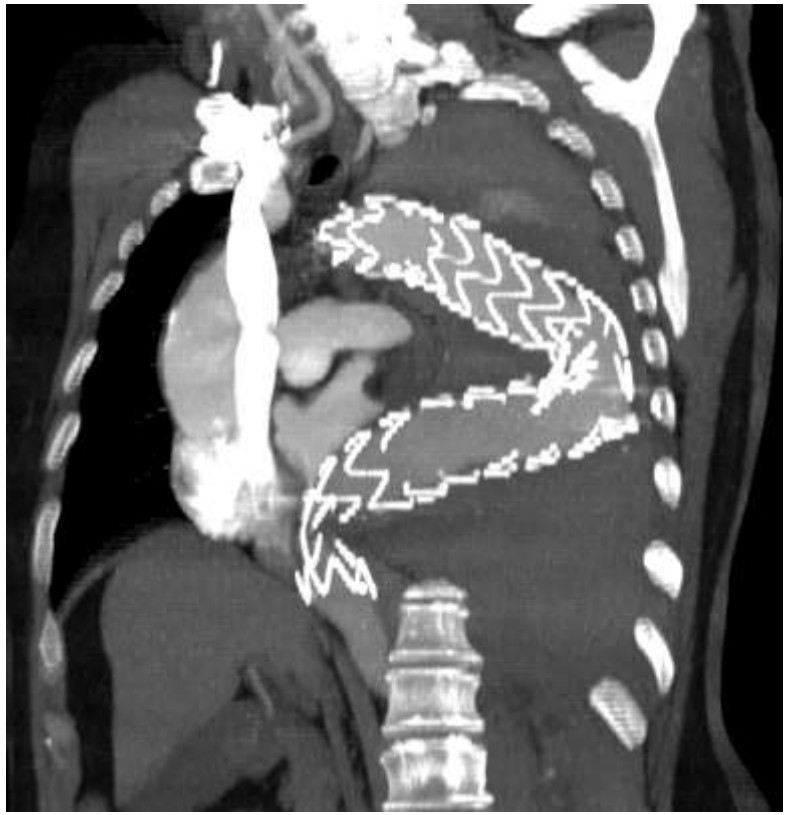
05.2017

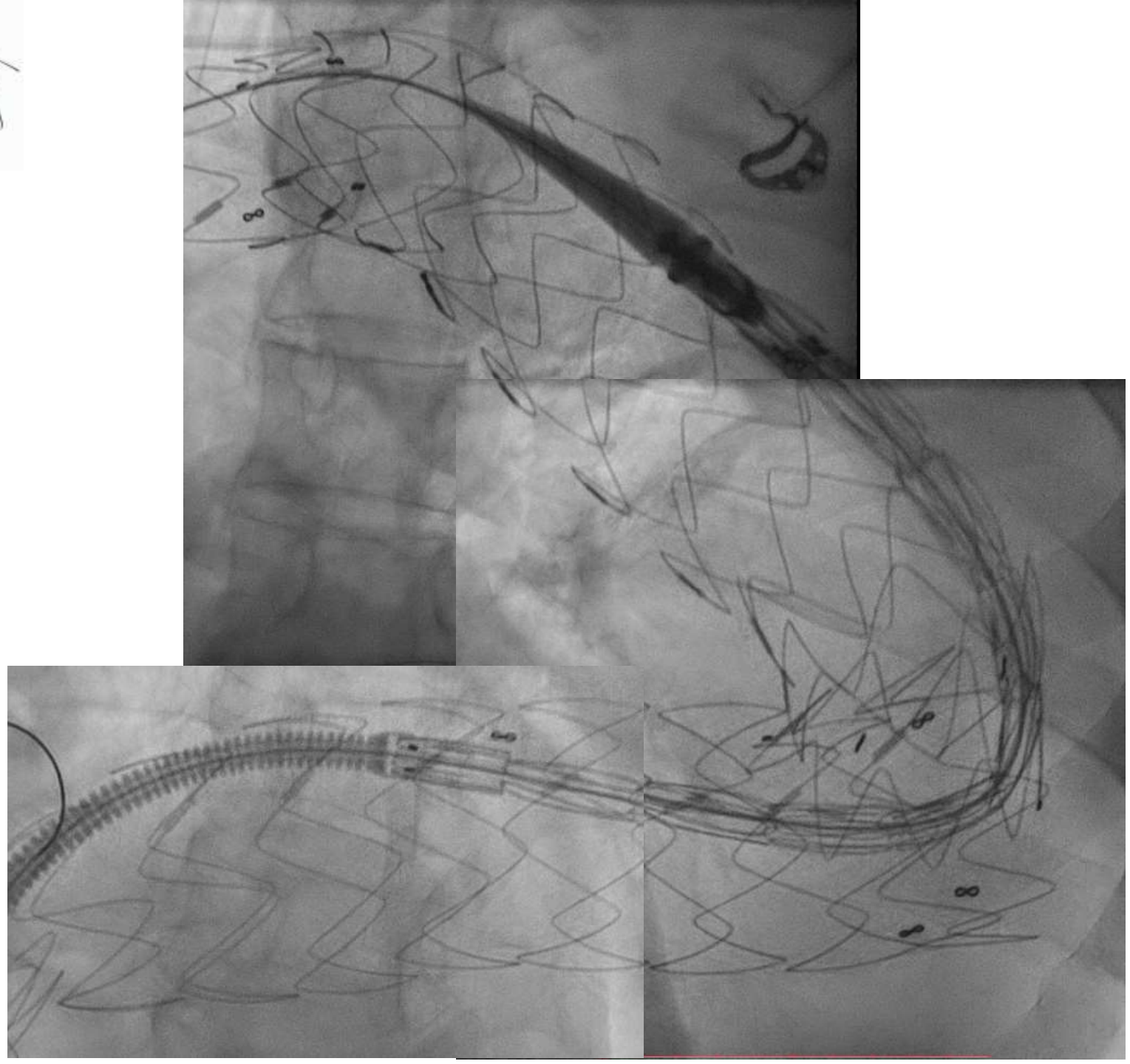
06.2018

06.2019

Гемоторакс, расхождение графтов





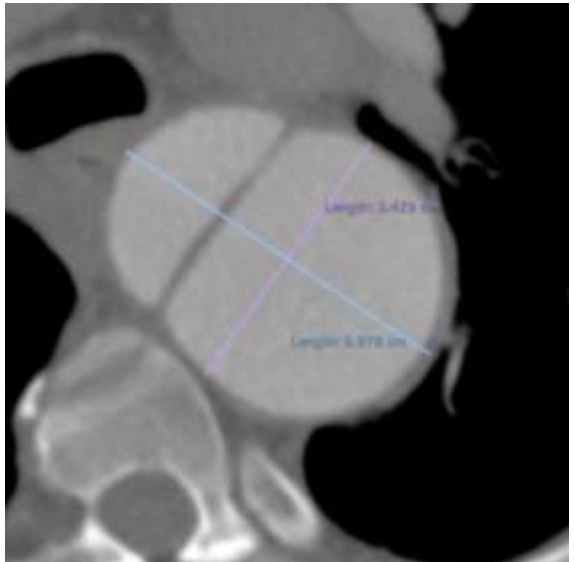


Частота встречаемости расхождения графтов

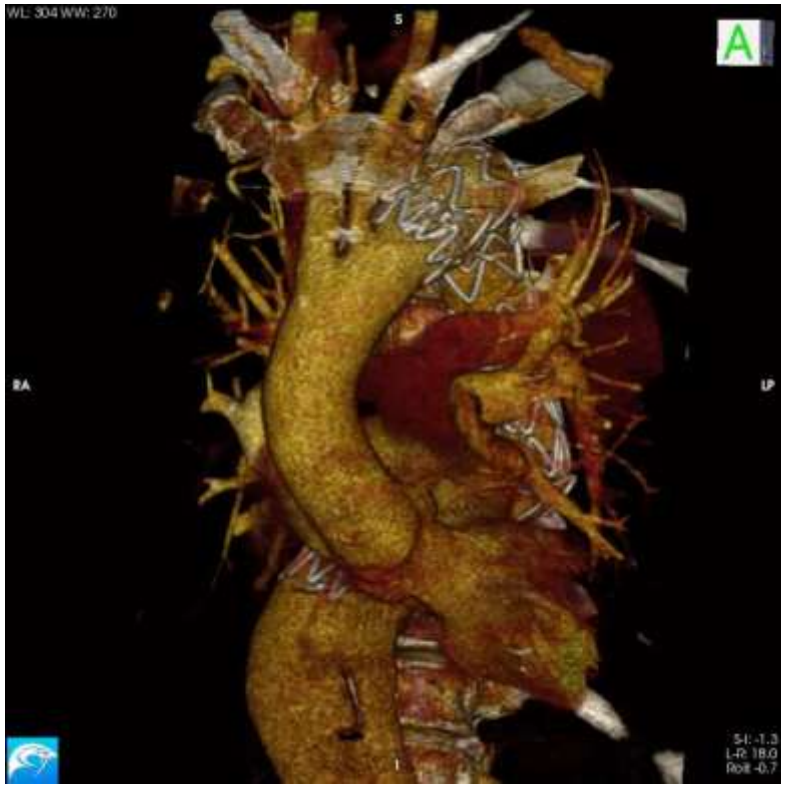
- Philipp Geisbusch – 7.3%
- Регистр РНЦХ – около 4%

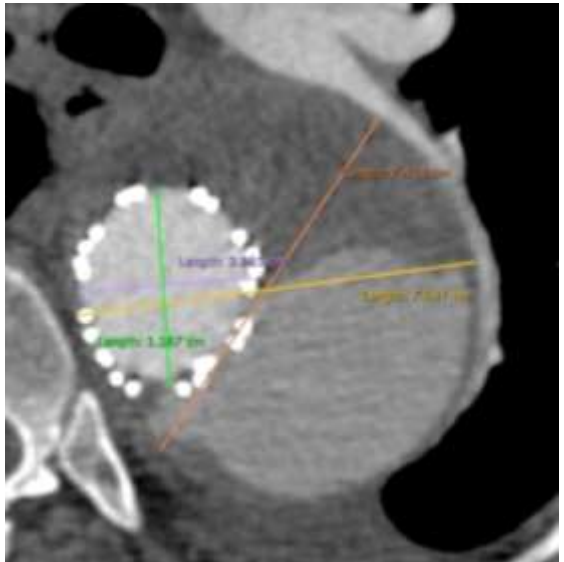
Нарушение целостности графта

MCKT 11.2017

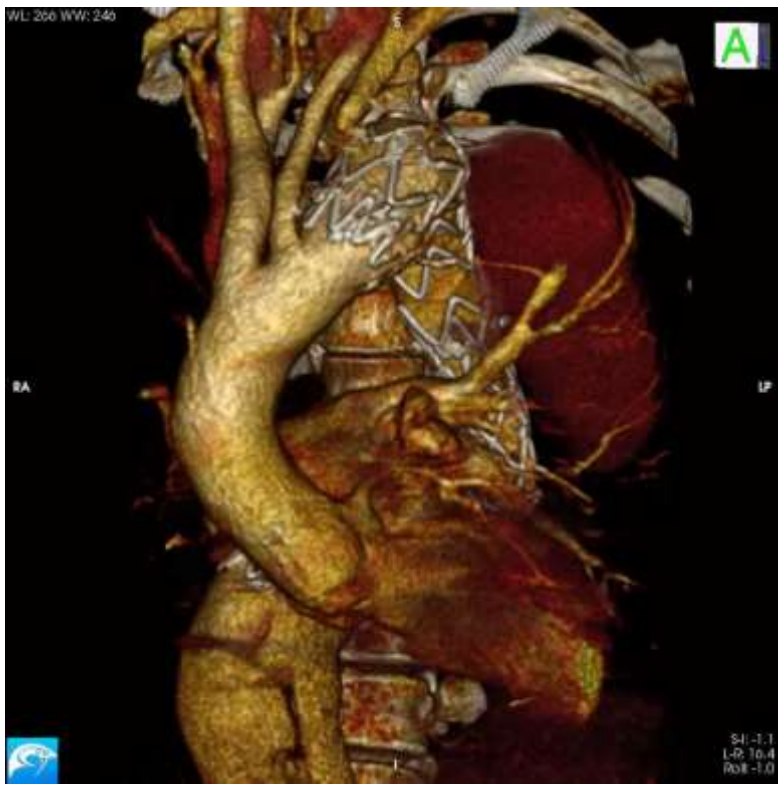


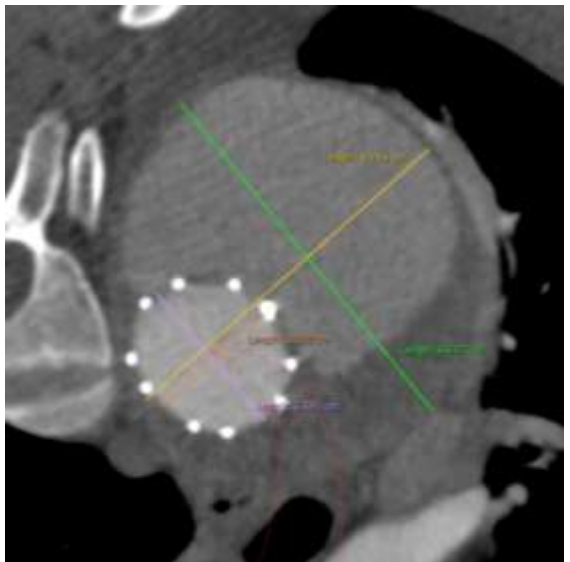
MCKT 06.2019

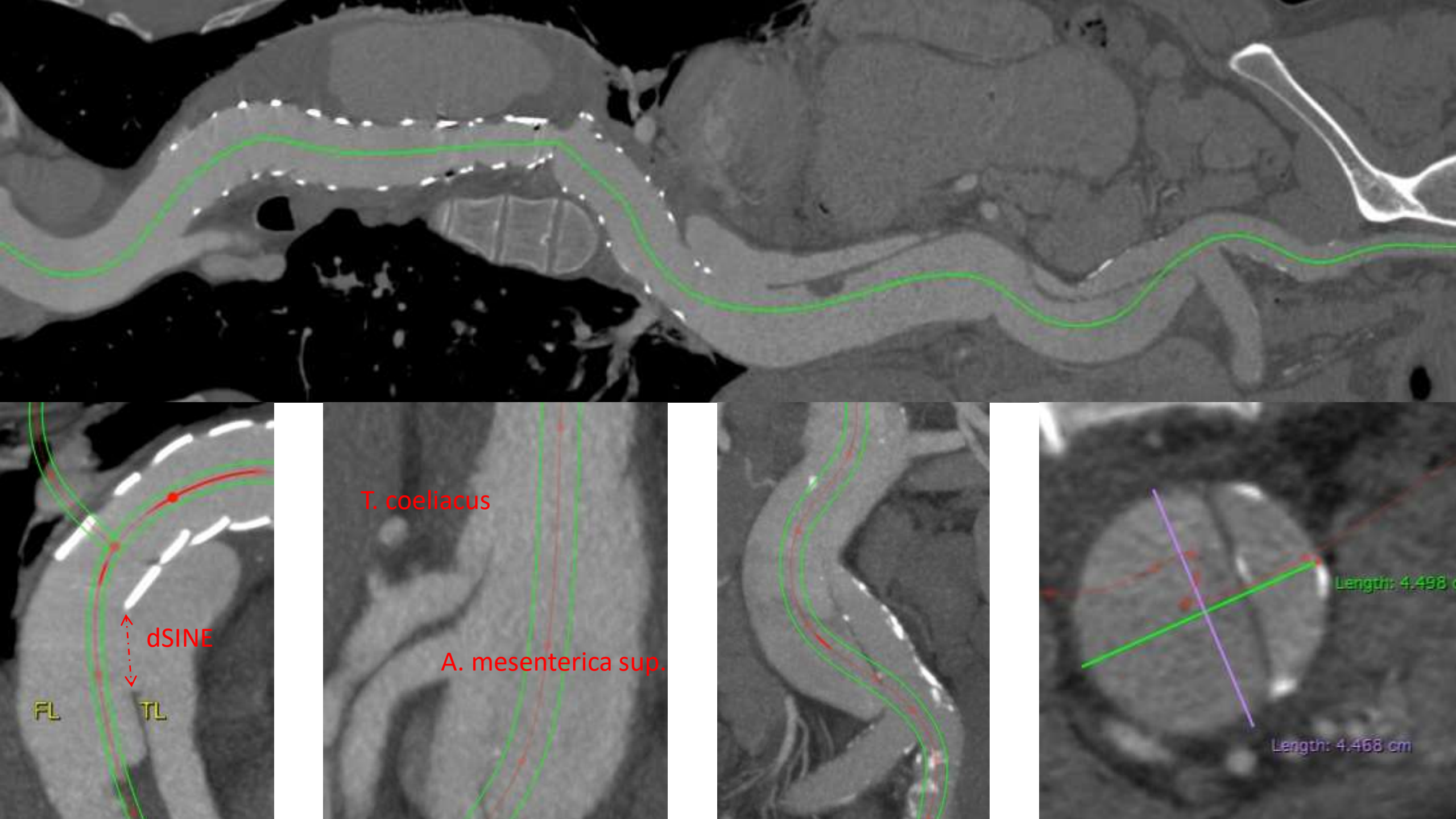




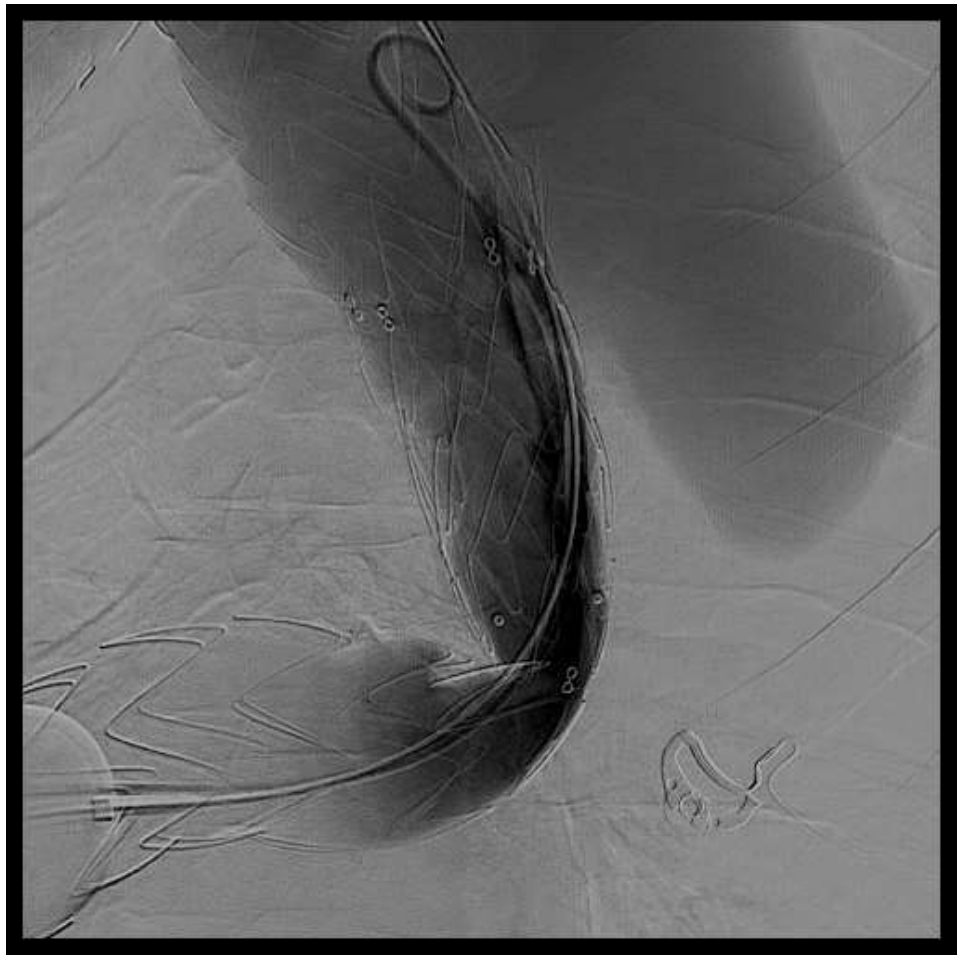
MCKT 10.2019

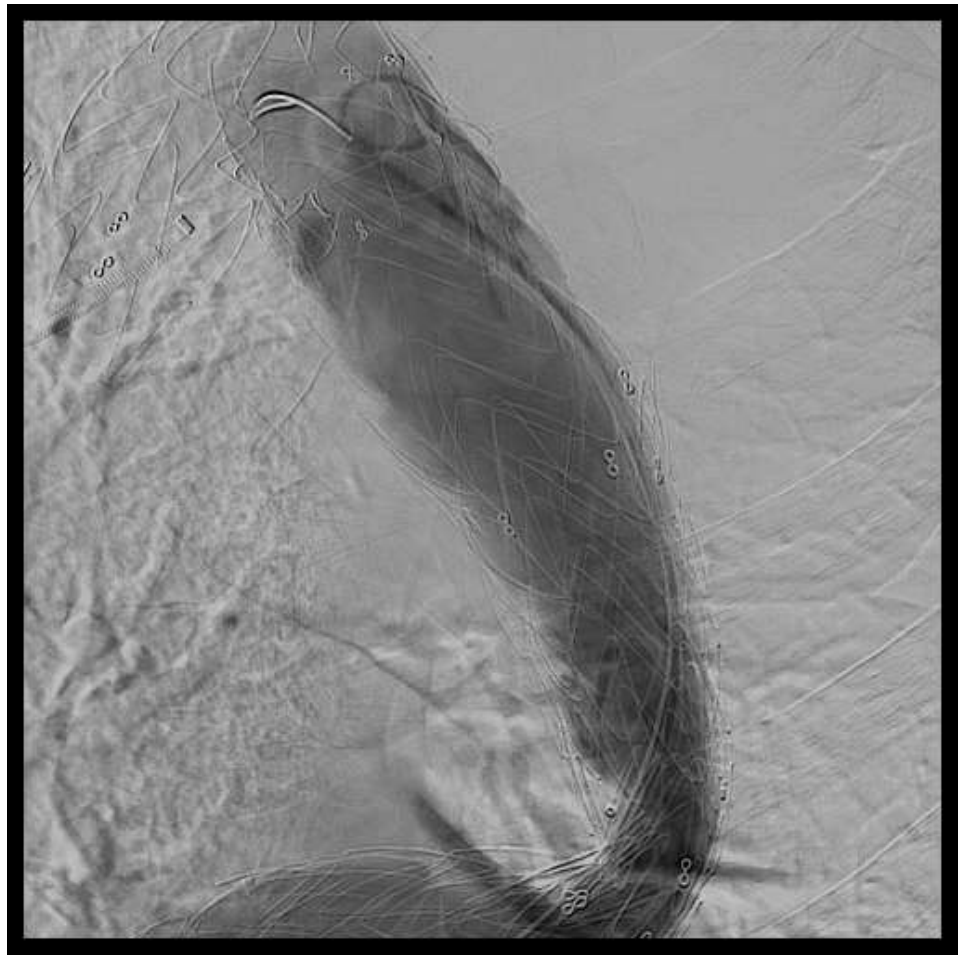





dSINE
FL
TL
T. coeliacus
A. mesenterica sup.
Length: 4.498
Length: 4.466 cm

Имплантация дополнительного графта





Частота встречаемости перфорации грудного графта

- В литературе данные почти отсутствуют
- Регистр РНЦХ - 1.2%

Генетически детерминированное поражение соединительной ткани

Editor's Choice – Management of Descending Thoracic Aorta Diseases

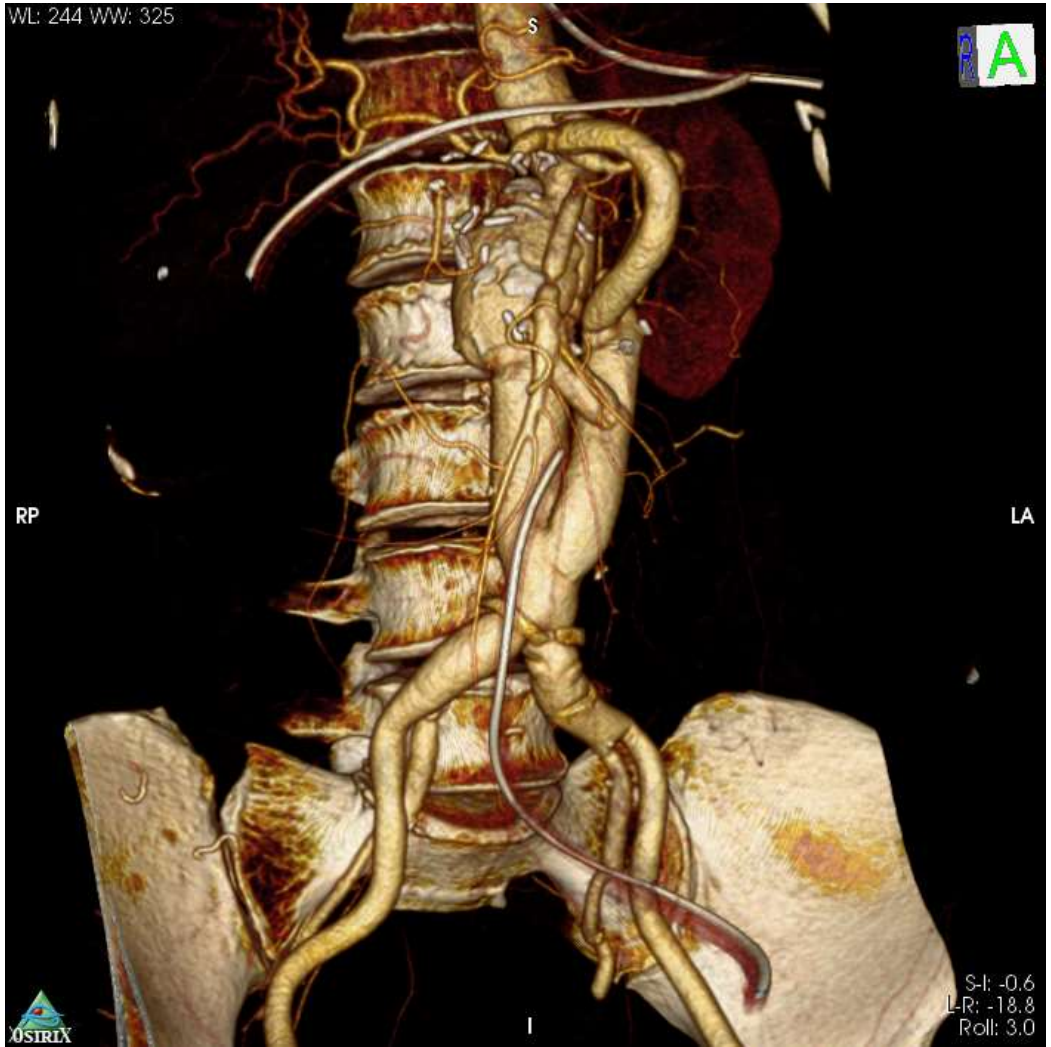
Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS)

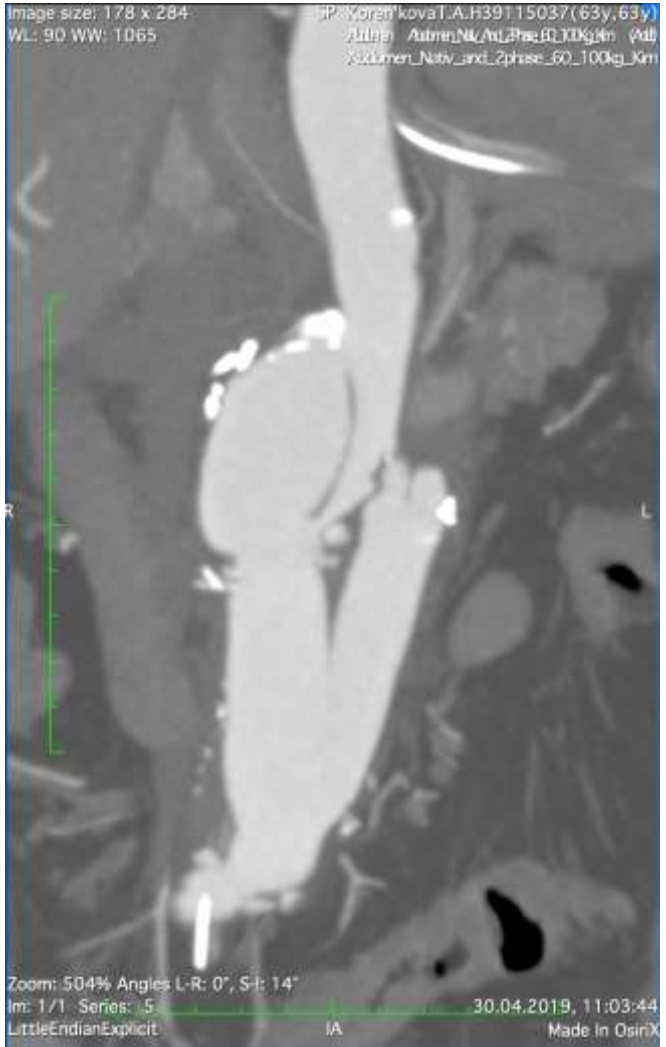
V. Riambau[a], D. Böckler[a], J. Brunkwall[a], P. Cao[a], R. Chiesa[a], G. Coppi[a], M. Czerny[a], G. Fraedrich[a], S. Haulon[a], M.J. Jacobs[a], M.L. Lachat[a], F.L. Moll[a], C. Setacci[a], P.R. Taylor[a], M. Thompson[a], S. Trimarchi[a], H.J. Verhagen[a], E.L. Verhoeven[a], ESVS Guidelines Committee[b], P. Kolh, G.J. de Borst, N. Chakfé, E.S. Debus, R.J. Hinchliffe, S. Kakkos, I. Koncar, J.S. Lindholt, M. Vega de Ceniga, F. Vermassen, F. Verzini, Document Reviewers[c], P. Kolh, J.H. Black III, R. Busund, M. Björck, M. Dake, F. Dick, H. Eggebrecht, A. Evangelista, M. Grabenwöger, R. Milner, A.R. Naylor, J.-B. Ricco, H. Rousseau, J. Schmidli

Recommendation 66			
In Marfan syndrome, use of prophylactic beta-adrenergic blockade and of angiotensin II receptor blockers should be considered	IIa	C	82,270
Recommendation 67			
In patients with Ehlers-Danlos syndrome, treatment with celiprolol	IIa	B	283
Recommendation 68			
Patients with Loeys-Dietz and Ehlers-Danlos syndromes should be considered for treatment in collaboration with highly specialized referral centres	IIa	C	284
All first degree relatives of patients considered to be part of a familial aneurysm disorder may be considered for screening with imaging for descending thoracic aortic and abdominal aortic aneurysms at the age of 50, repeated thereafter at regular intervals	IIb	C	62
Recommendation 70			
Reproductive health counselling by genetic specialists should be offered to patients diagnosed with any genetic connective tissue disorder	I	C	271,272,278,279
Recommendation 71			
Women with a confirmed genetic connective tissue disorder should be advised regarding the relative risks of pregnancy to both mother and foetus	I	C	277,286,287
Recommendation 72			
In patients with genetic syndromes associated with thoracic aortic aneurysm dilatation ≥50 mm, surgery should be considered	IIa	C	
Recommendation 73			
In patients with a genetic syndrome and enlarged aortic diameter <50 mm, surgery may be considered according to body surface area in patients of small stature or for rapid progression or more aggressive diseases or with a family history of dissection	IIb	C	281
Recommendation 74			
In patients with connective tissue disorder, endovascular repair may be considered in redo operations or in emergencies as bridging procedures	IIb	C	193,285

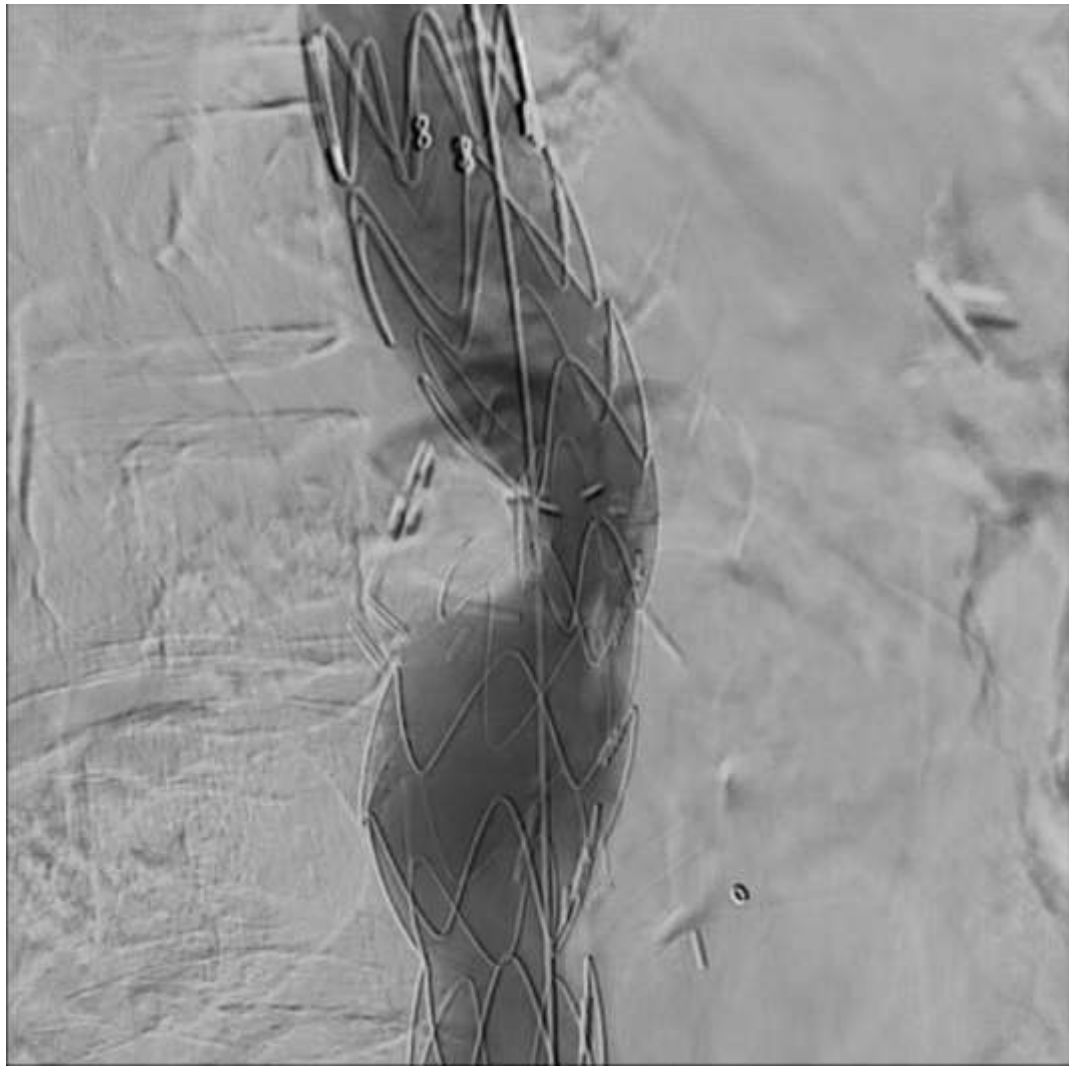
Синдром Элерса-Данло

Синдром Элерса-Данло

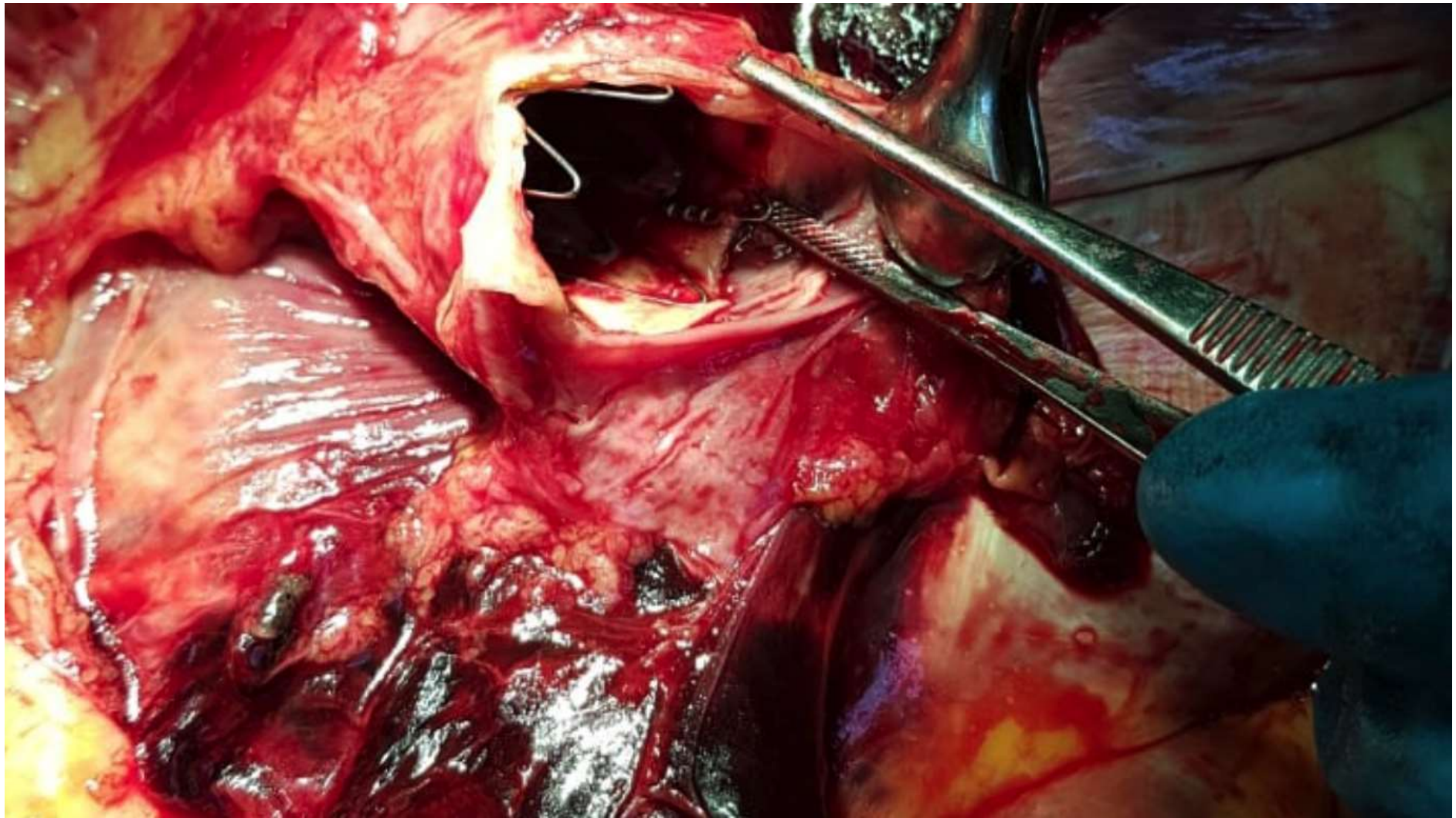




Синдром Элерса-Данло

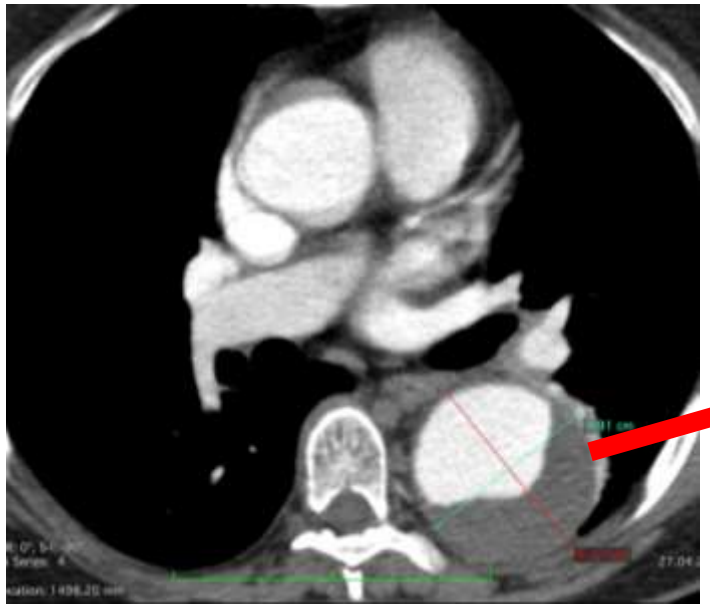


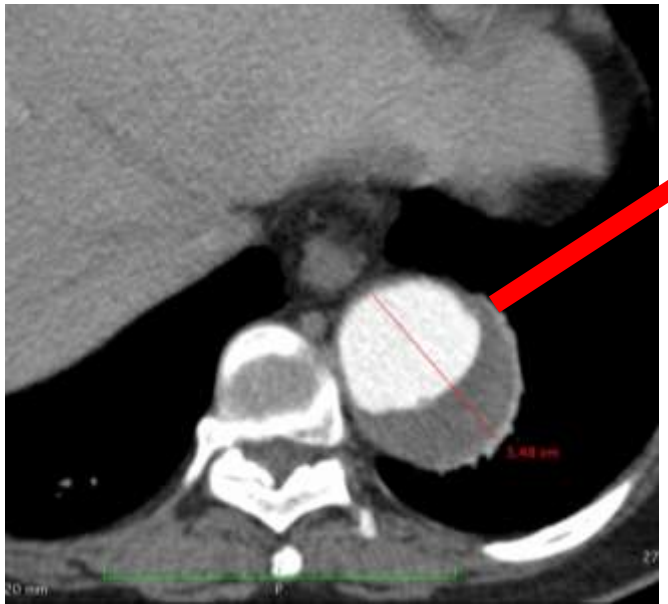
Полный поперечный разрыв аорты через 48 часов

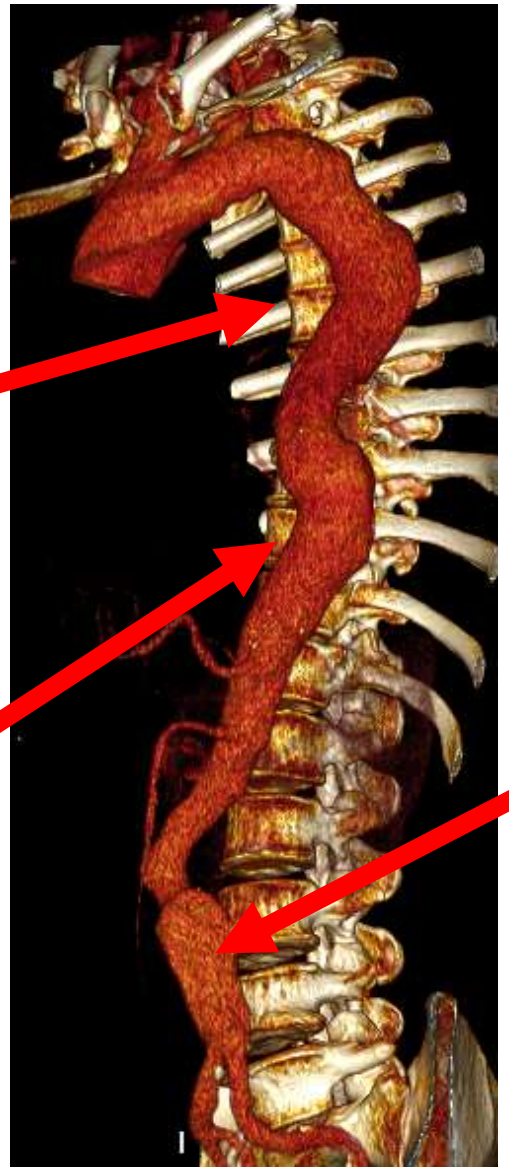


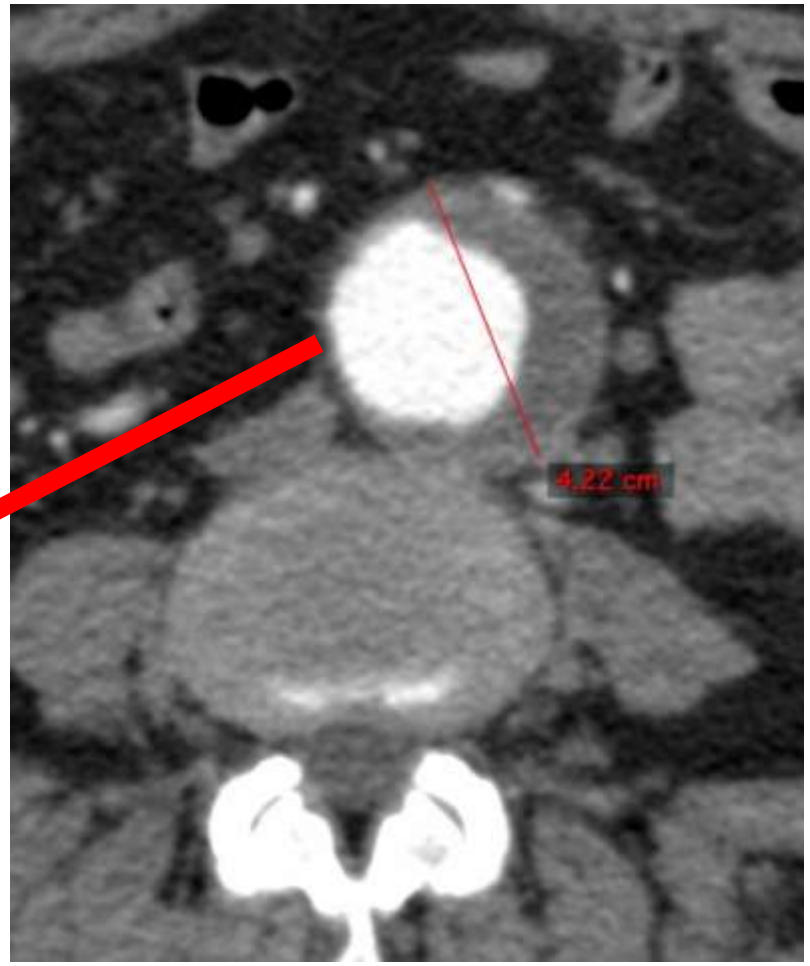
Аорто-медиастинальный свищ

Многоуровневая дилатация аорты 27.04.2018

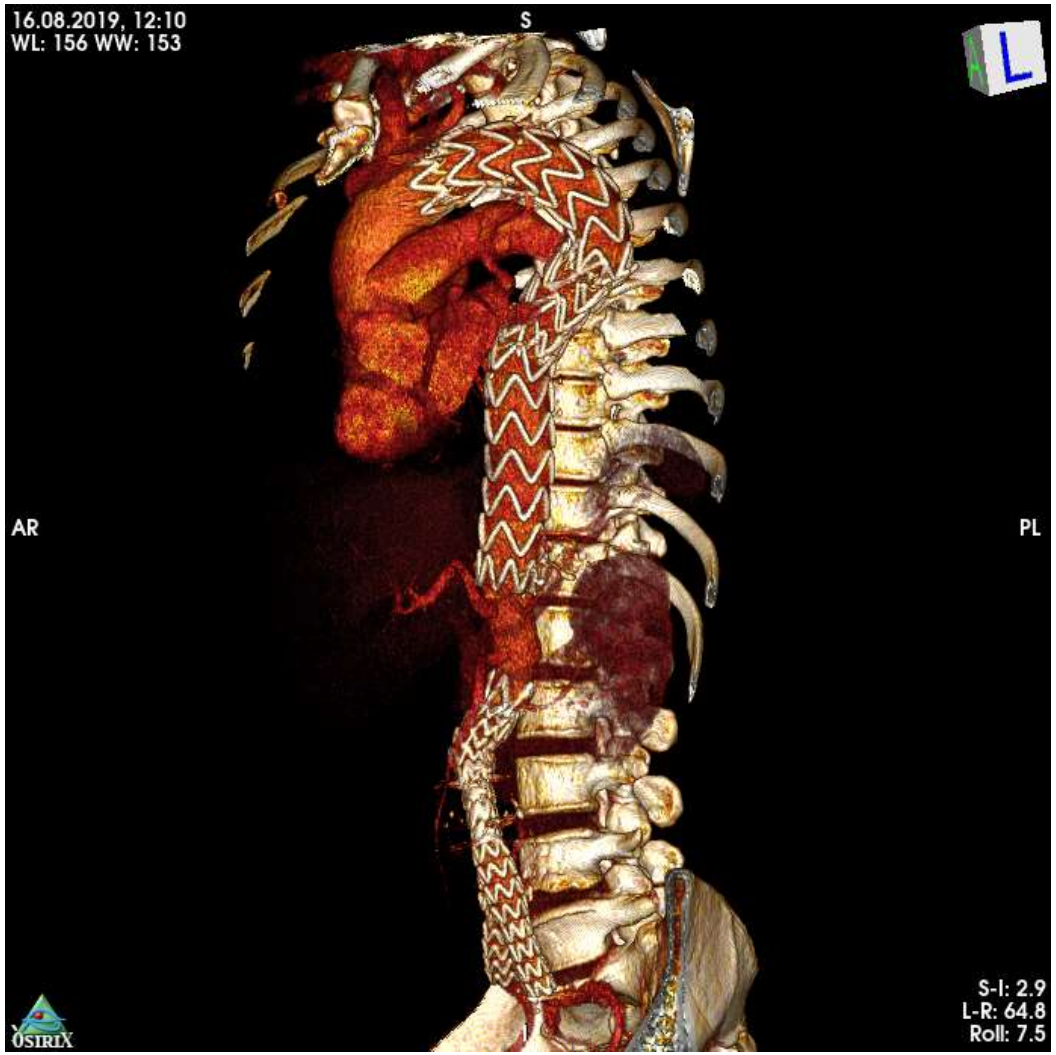


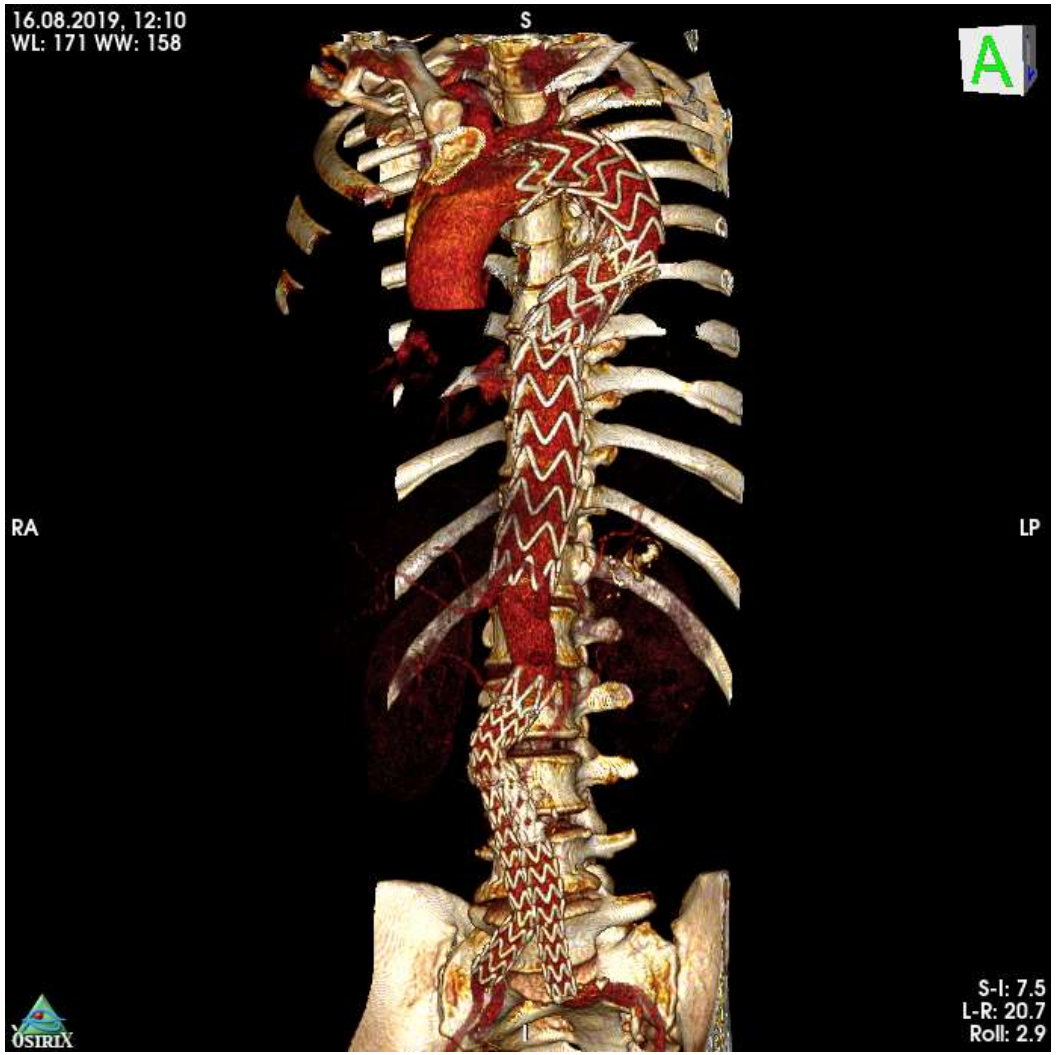




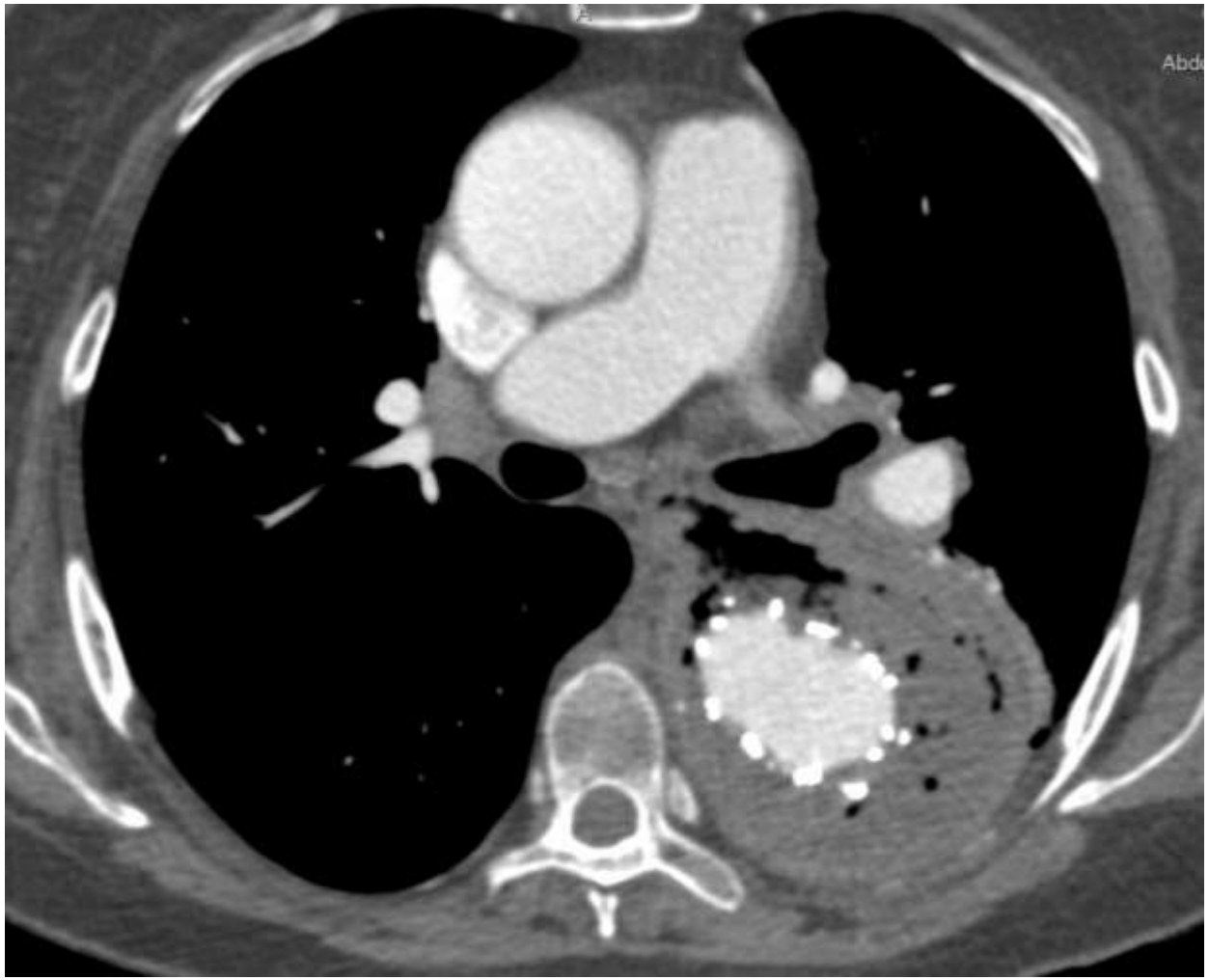


Контроль после этапной реконструкции 16.08.2019





23.03.21



Общий вывод

- TEVAR наверняка не хуже OSR
- Вместе с тем, имеются преимущества у каждого из методов

Чрезвычайно важно!!!

- Нам необходимо проводить контрольные исследования всем больным после стентирования грудной аорты не реже 1 раза в год на протяжении всей жизни
- Контроль расхождения графтов может осуществляться с помощью обычного рентгеновского исследования
- Избегать имплантации графта в нативную аорту у больных с генетически детерминированным поражением соединительной ткани

Чрезвычайно важно!!!

- Обсудить вопрос очень длительной антибиотикотерапии при некоторых аневризмах
- Иметь в виду возможность фенестрации графтов