

prof. dr hab. n. med. Marek Maruszyński

**Wewnątrznaczyniowe leczenie pękniętych tętniaków
aorty brzusznej powinno być leczeniem z wyboru !**

ZA



**VI MIĘDZYNARODOWA KONFERENCJA
NAUKOWO – SZKOLENIOWA
Polskiego Towarzystwa Chirurgii Naczyniowej**

Zakopane, 7-9 czerwca 2013r

RUTHERFORD'S VASCULAR SURGERY

7TH EDITION



VOLUME TWO

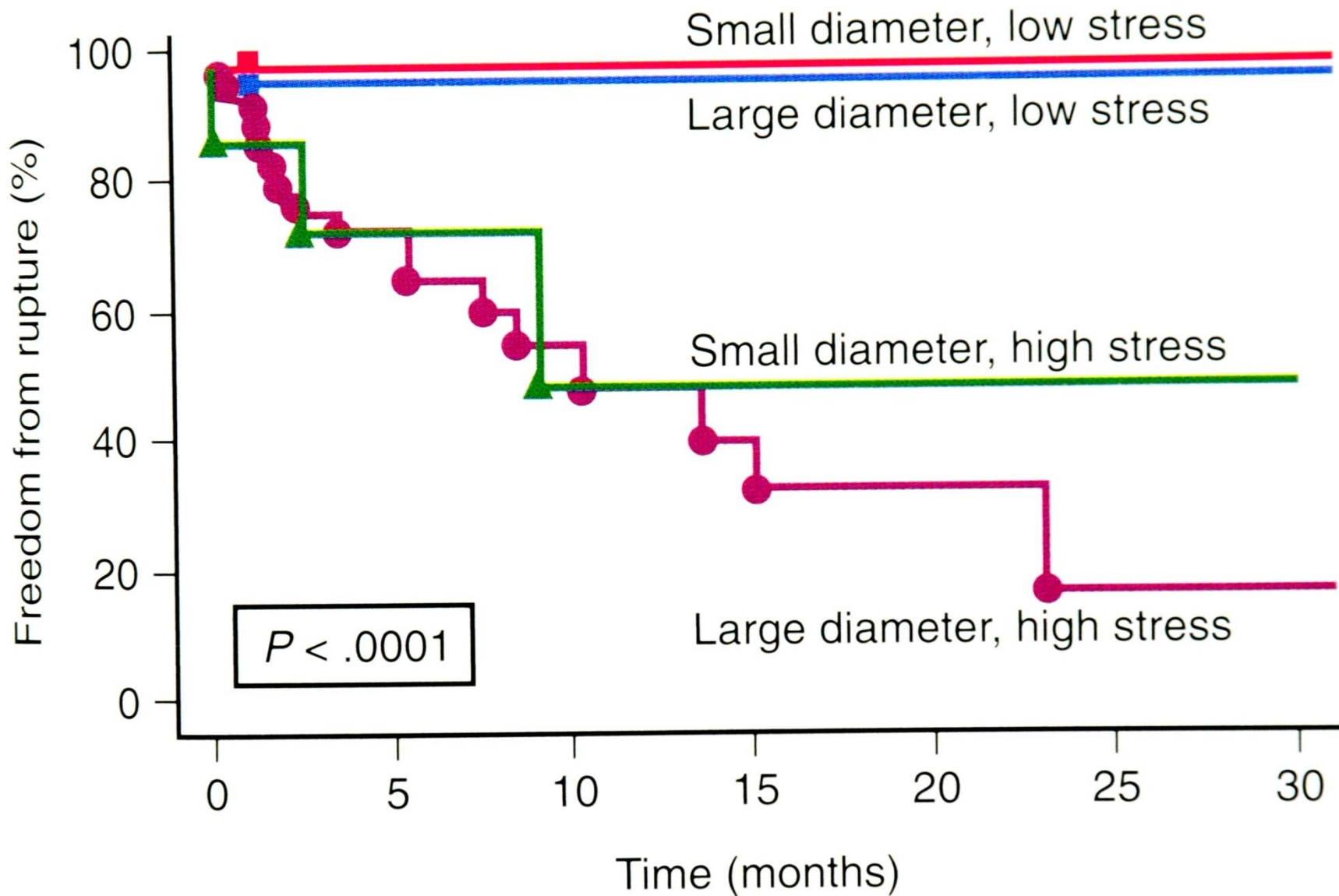
Cronenwett and Johnston

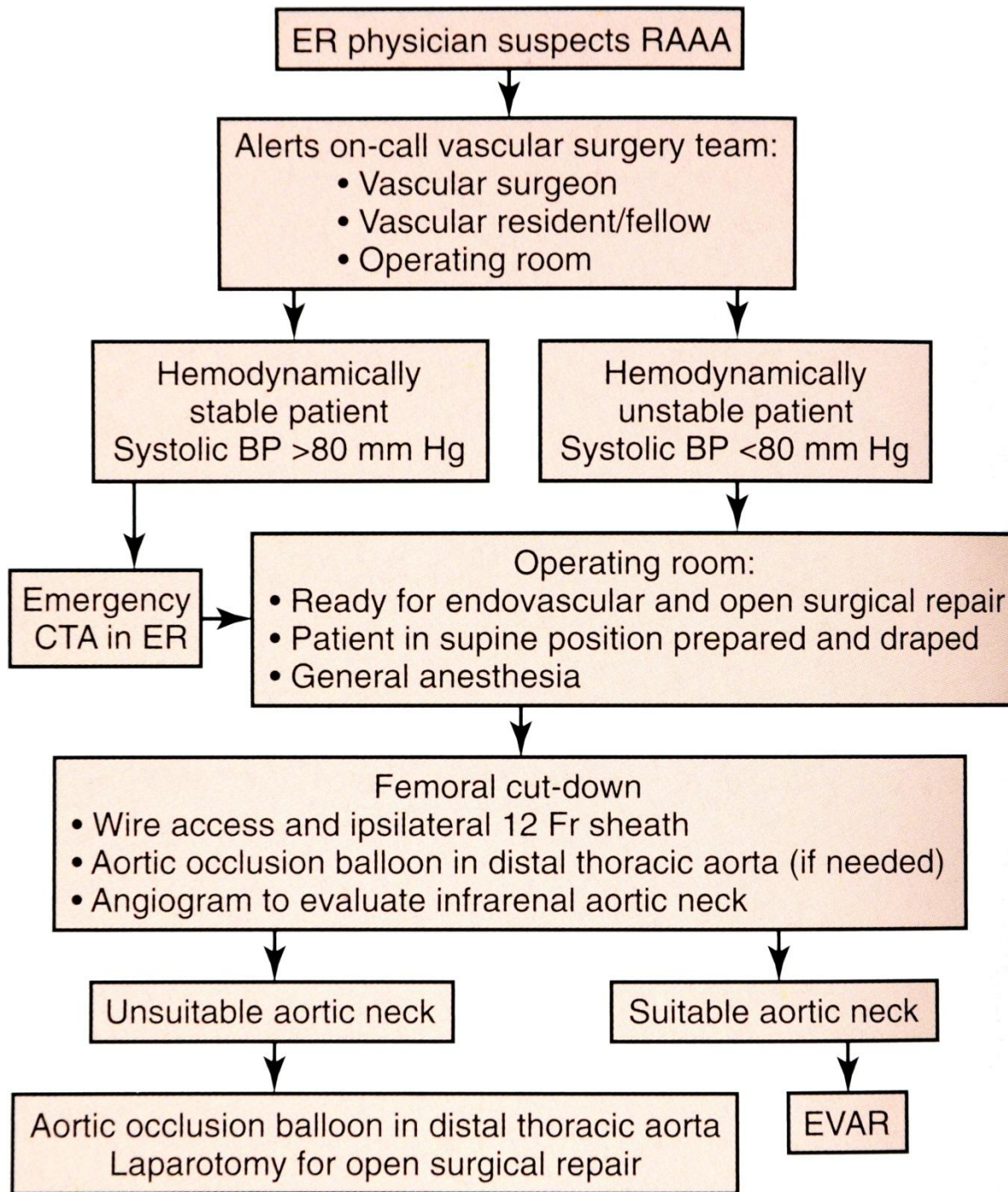
CAMBRIA • GLOVICZKI • MESSINA • MILLS • PERLER • SEEGER • SIDAWY • WEAVER

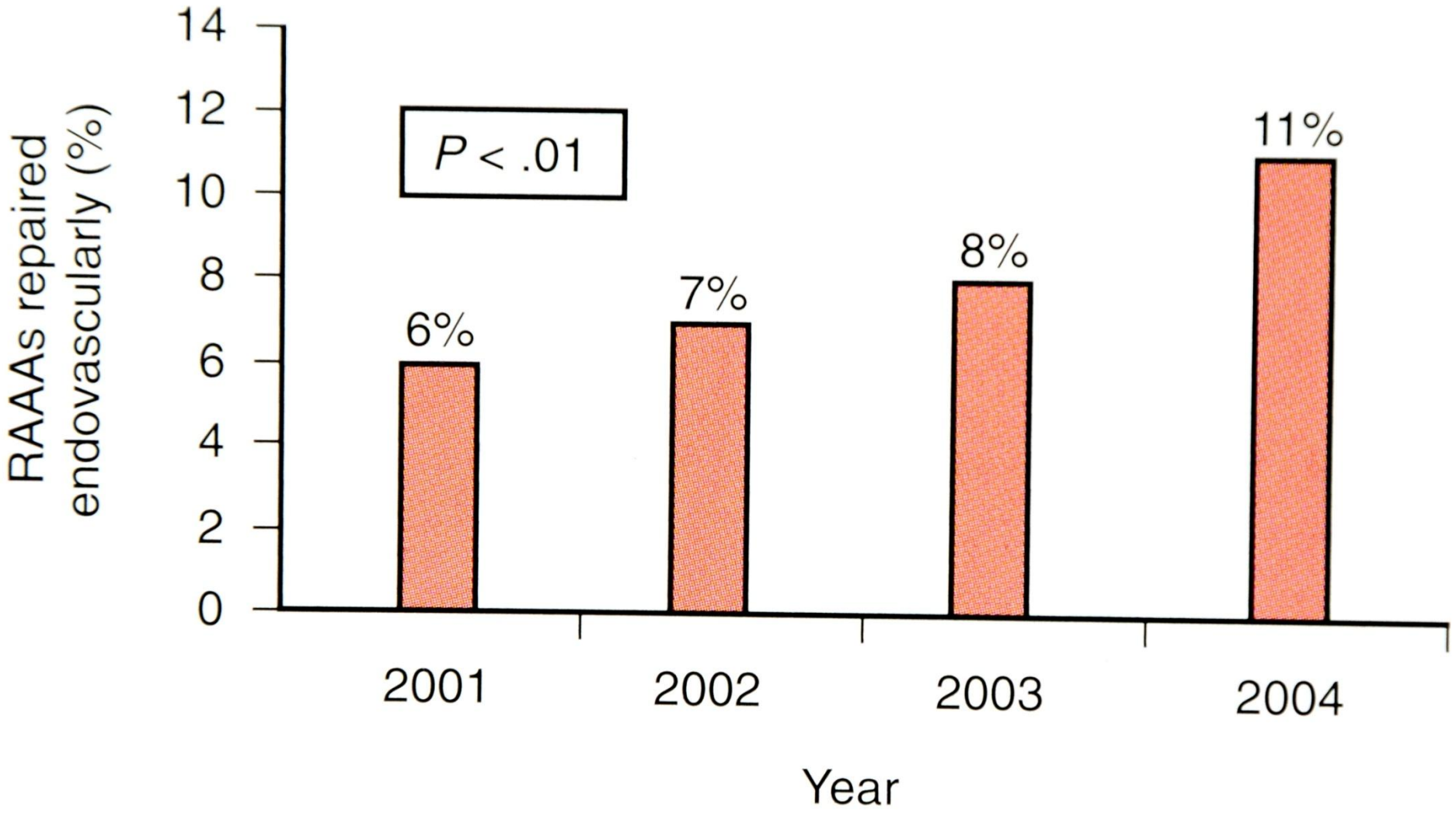
SAUNDERS
ELSEVIER

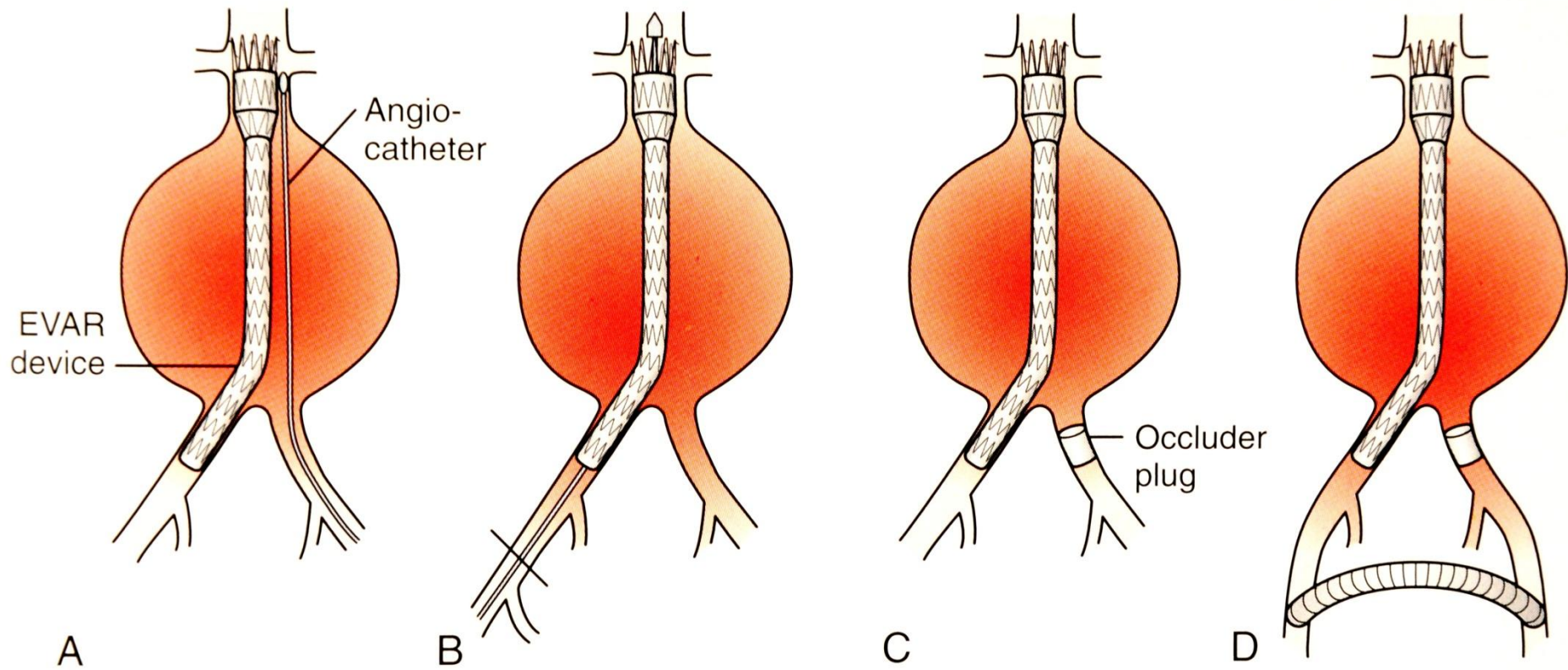
 **SVS**
SOCIETY for VASCULAR SURGERY

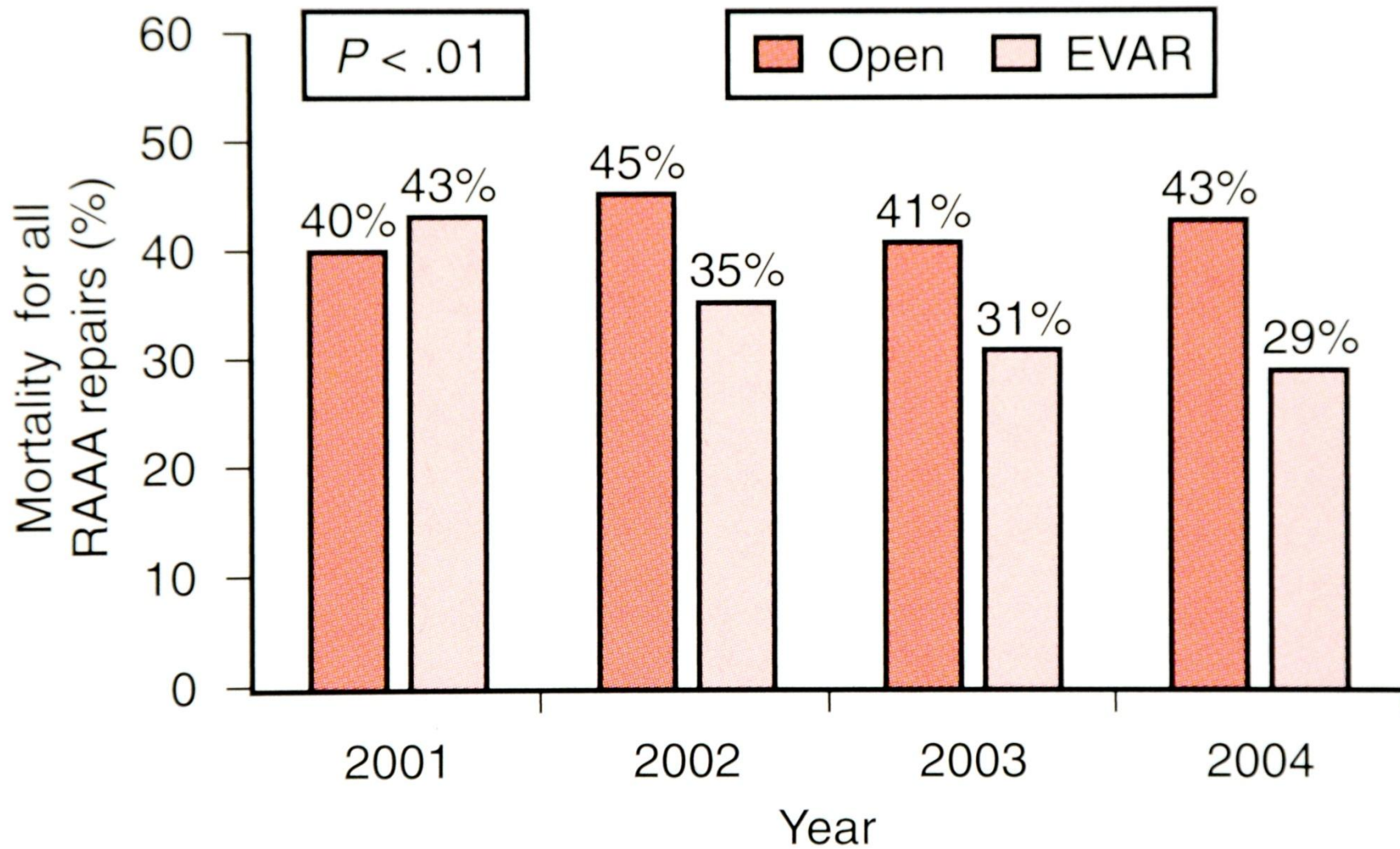
PUBLISHED IN ASSOCIATION WITH THE SOCIETY FOR VASCULAR SURGERY

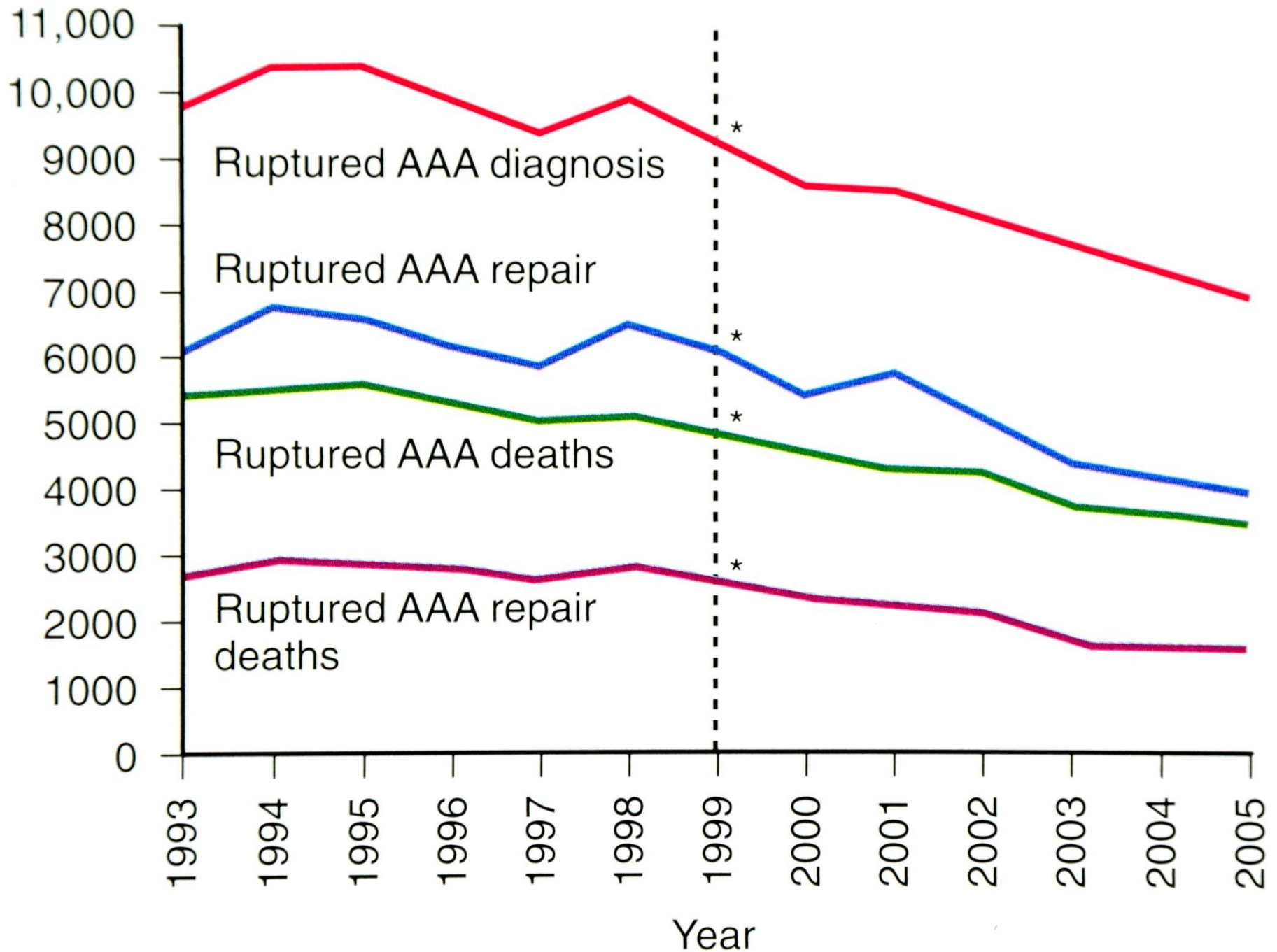


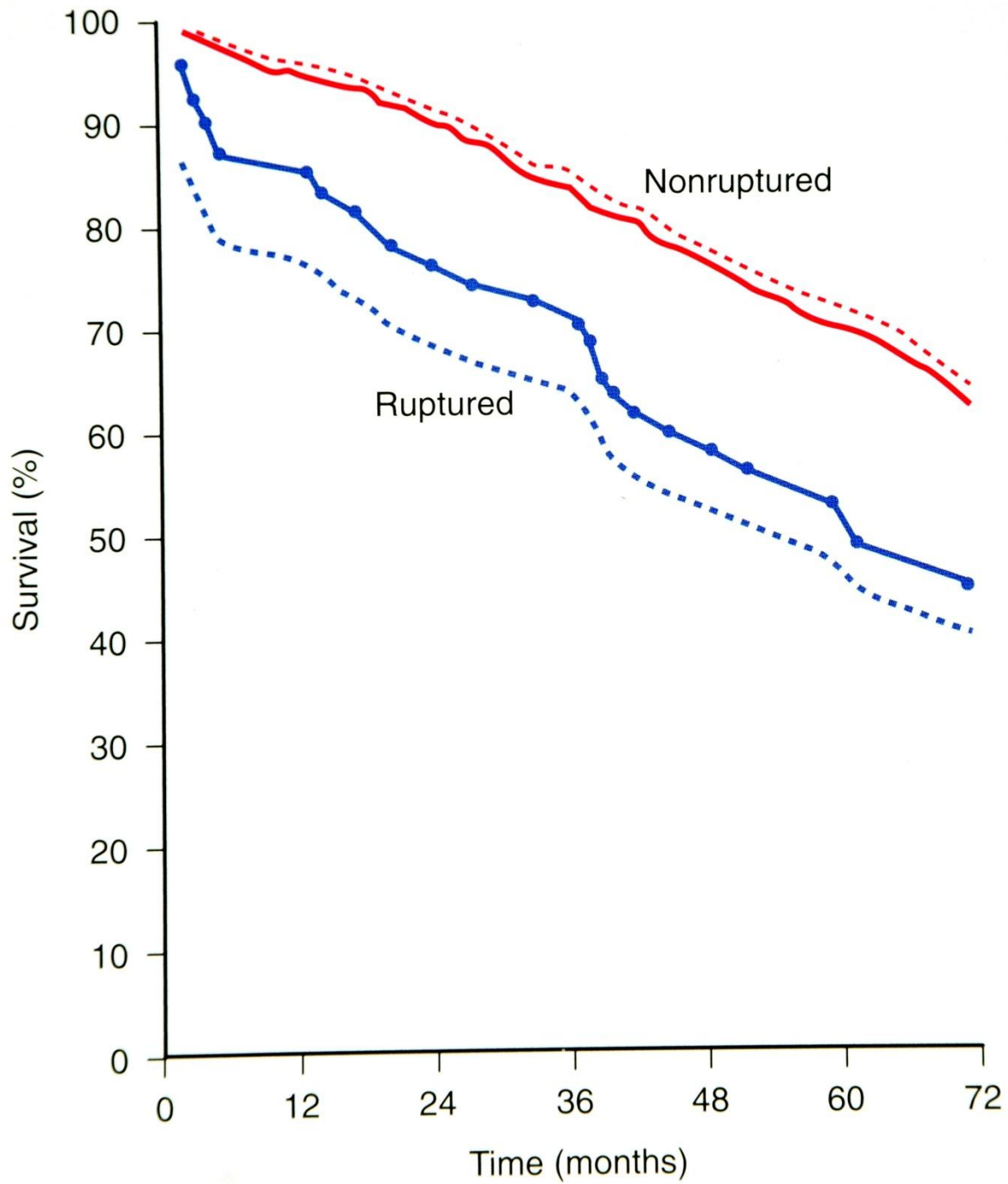












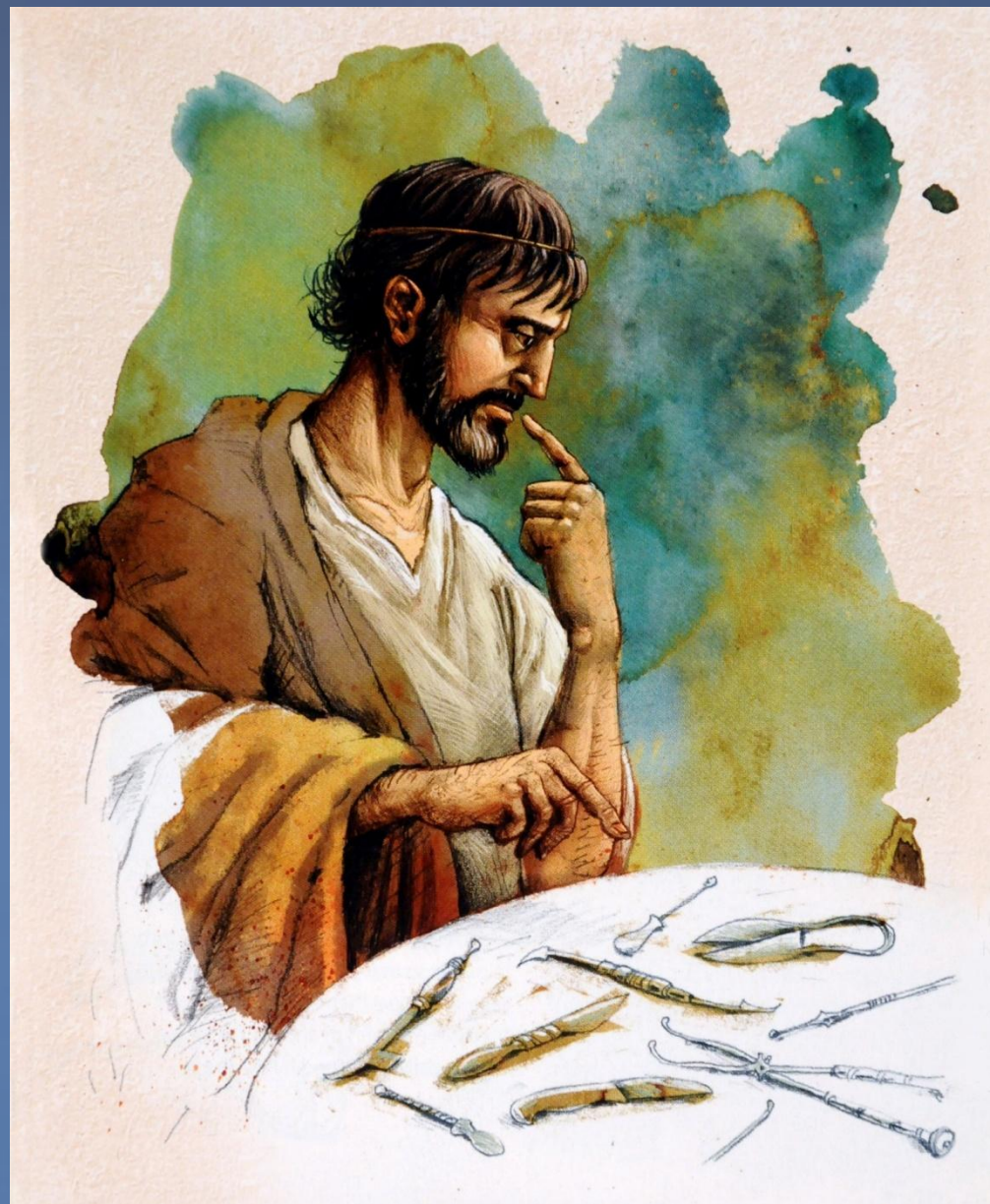


RAAA

Klasycznie

Czy

Endowaskularnie ?



POSTĘP NAUK
MEDYCZNYCH



Oczekiwanie
Chorego

POSTĘP
TECHNOLOGII

Ekonomia

Ekonomia

6

×

1

worek

tętniaka w granicach „tkanek zdrowych”



TAK bo NIE powoduje :

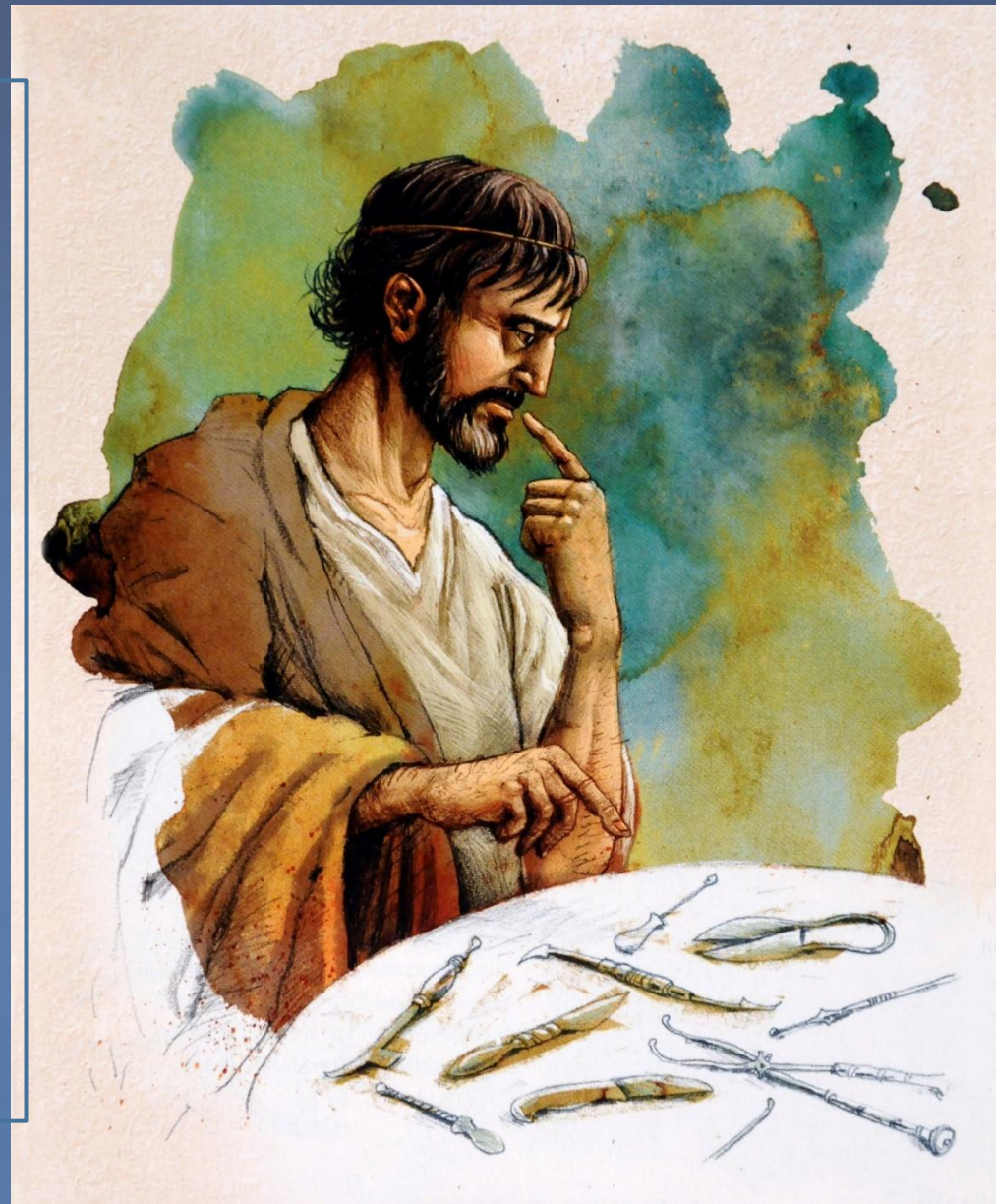
- reakcji na środki cieniujące (niewydolność nerek !)
- „migracji, pęknięcia, skręcenia, złamania stentgraftu”
- przecieków, konieczności ponownych interwencji („O” / „E”)
- zamknięcia odgałęzień dużych naczyń
- zespołu poimplantacyjnego
- ekspozycji na napromieniowanie
- konieczności „nadzoru pooperacyjnego”

RAA

Klasycznie
Chirurgicznie

czy

ENDOWASKULARNIE



Brak możliwości technicznych wykonania operacji endowaskularnych

30 % = „nieprzyjazna anatomia” dla implantacji stengraftu

Chorzy z niewydolnością nerek

Uczulenie na środki kontrastowe

- ⌘ reakcja na środki cieniujące (niewydolność nerek !)
- ⌘ migracja, pęknięcie , skręcenie, złamanie
- ⌘ przecieki i konieczność ponownych interwencji („O” / „E”)
- ⌘ zamknięcie odgałęzień dużych naczyń
- ⌘ zespół poimplantacyjny
- ⌘ ekspozycja na napromieniowanie

POSTĘP NAUK
MEDYCZNYCH



Oczekiwa
nie
Chorego

Ekonomi
a

POSTĘP
TECHNOLO
GII



Gen. bryg. (rez).

prof. dr hab. n. med. Marek Maruszyński

Leczenie chirurgiczne tętniaków aorty brzusznej - czy jest jeszcze uzasadnione ?



Warsztaty Naukowo – Szkoleniowe
Interwencje Endowaskularne II stopień
Wrocław 24.11.2012 roku

RAAA

OTWARTO = 1952



ENDOWASKULARNIE = 1994



RAAA

OTWARTO = 1952

ENDOWASKULANIE = 1994

RAAA



& EVAR

- & Śmiertelność okołoperacyjna 18-53%
- & Abdominal compartment syndrome
- & Niewydolność wielonarządowa
- & Endoleak

& Chirurgia

- & Śmiertelność okołoperacyjna 20-70%
- & Niewydolność wielonarządowa

Management of Abdominal Aortic Aneurysms Clinical Practice Guidelines of the European Society for Vascular Surgery. F.L. Moll et al. Eur J Vasc Endovasc Surg (2011) 41, S1eS58



SC

RA

D

Dziękuję za uwagę



worek

tętniaka w granicach „tkanek zdrowych”



TAK bo NIE powoduje :

- reakcji na środki cieniujące (niewydolność nerek !)
- „migracji, pęknięcia, skręcenia, złamania stentgraftu”
- przecieków, konieczności ponownych interwencji („O” / „E”)
- zamknięcia odgałęzień dużych naczyń
- zespołu poimplantacyjnego
- ekspozycji na napromieniowanie
- konieczności „nadzoru pooperacyjnego”

MOŻLIWE ZDARZENIA NIEPOŻĄDANE ZWIĄZANE Z IMPLANTACJĄ STENTGRAFTU (wg „INSTRUKCJI UŻYTKOWANIA”)

!99 (20) = „charakterystycznych” dla implantacji
stentgraftu

- ⊗ reakcja na środki cieniujące (niewydolność nerek !)
- ⊗ migracja, pęknięcie , skręcenie, złamanie
- ⊗ przecieki i konieczność ponownych interwencji („O” / „E”)
- ⊗ zamknięcie odgałęzień dużych naczyń
- ⊗ zespół poimplantacyjny
- ⊗ ekspozycja na napromieniowanie
- ⊗ „nadzór pooperacyjny”



WOJSKOWY INSTYTUT MEDYCZNY
UL. SZASERÓW 128; 04-141 WARSZAWA 44
WWW.WIM.MIL.PL



RAAA + OPEN REAIR

Niedokrwienie
Reperfuzja

Wstrząs
krwotoczny

Niedokrwienie
dolnej
„połowy ciała”

RAAA + OPEN REAIR

Wstrząs
krwotoczny

```
graph TD; A(Wstrząs krwotoczny) --> B(Niedokrwienie dolnej „połowy ciała”); A --> C(TOTAL BODY ISCHEMIA)
```

The diagram consists of three main elements: a red oval at the top left containing the text 'Wstrząs krwotoczny', a blue oval at the top right containing the text 'Niedokrwienie dolnej „połowy ciała”', and a light blue rounded rectangle at the bottom left containing the text 'TOTAL BODY ISCHEMIA'. A red double-lined arrow points from the red oval to the blue oval, and another red double-lined arrow points from the red oval down to the rounded rectangle.

Niedokrwienie dolnej
„połowy ciała”

TOTAL
BODY
ISCHEMIA

RAAA + ENDOVASCULAR REPAIR

Bez

LAPAROTOMII

- BEZ DODATKOWEJ UTRATY KRWI
- BEZ ZNIECZULENIA OGÓLNEGO
- BEZ JATROGENNYCH USZKODZEŃ

ZMNIJSZENIE
CZASU TRWANIA
I CIĘŻKOŚCI

Niedokrwienia
dolnej
„połowy
ciała”

**WORLD & PERSONAL
EXPERIENCE WITH
ENDOASC Rx OF RAAAs**

FRANK J. VEITH

**ESVS COURSE ON TREATMENT
OF AORTIC RUPTURE**

UNIV HOSP ZURICH – DEC 2, 2012



**COLLECTED WORLD EXPER
WITH ENDOVASCULAR Rx
(EVAR) FOR RUPT AAAs**

**FJ VEITH, M LACHAT, D MAYER
E VERHOEVEN, G COPPI, T LARZON
M MALINA & RAAA INVESTIGATORS**

**ANN SURG -- NOV 2009;
250 : 818-824**

RESULTS - I

- **30-DAY MORTALITY
FOR 1037 EVAR Rxd PTS
21%
(VS. 35-55% 30-D MORTALITY
FOR OPEN REPAIR FROM LIT)**
- **HOWEVER FLAWED COMPARISON
SOME EVAR PTS MORE STABLE**

RESULTS II – UPDATED THROUGH 2009

- FROM 13 CTRS – EVAR ON
ALL ANAT POSS RAAA PTS
680 RAAA PTS Rxs BY EVAR
763 RAAA PTS RxD BY OR
30-DAY MORTALITY
EVAR OR
19.7% VS 36.3% (P<.0001)

**RESTRICT
RESUSCITATION
“HYPOTENSIVE
HEMOSTASIS”
IF MOVING & TALKING - OK
IF BP 50-70 mm Hg, IT'S OK**

II

- **PLAN & PREPARE**
- **SET UP & REHEARSE**
- **HELPS TO HAVE A
PROTOCOL &
AN ORGANIZATION**

III

- **PLACE TRANSFEMORAL
WIRE IN SUPRACELIAC
AORTA UNDER
LOCAL ANESTHESIA**

IV

- **ONLY PLACE LG SHEATH
& INFLATE BALLOON
IF NECESSARY
(~25% OF CASES)**

**V WHEN HYPOTENSIVE
HEMOSTASIS DOES
NOT WORK & NEED
SUPRACELIAC BALLOON
TECHNIQUE IS KEY**

CANNOT LOSE CONTROL

MALINA VEITH IVANCEV, JEVT 2005

BERLAND, VEITH ET AL JVS NOV 2012

VI

- WATCH FOR & Rx **ABD COMPARTMENT SYNDROME**
- DECOMPRESS PRN
- VAC DRESSING, ETC
- LACHAT, MAYER, RANCIC ET AL (JVS - JULY 2009)

VII

- **MUST USE EVAR ON ALL POSSIBLE PATIENTS**
- **MANY ONLY DO STABLE PTS WRONG BECAUSE... BIG SURVIVAL GAIN IS WITH HIGH RISK UNSTABLE PTS**

VIII

**WHEN EVAR NOT
POSSIBLE OPEN
REPAIR WITH OR
WITHOUT BALLOON**

CONCLUSION - RAAAs

THE LOW MORTALITY (< 20%) &
MANY INOPERABLE CASES
TREATED SUCCESSFULLY SHOW
EVAR IS A BETTER WAY TO
TREAT RUPTURED AAAs IN
ANATOMICALLY SUITED PTS

CONCLUSION II

**AS WITH EVERYTHING
ELSE IN THIS WORLD**

- **HOW YOU DO EVAR FOR
RAAAs MATTERS - &**
- **MUST INCLUDE THE KEY
ELEMENTS MENTIONED**

**OPEN REPAIR FOR RAAAs
IS BEST IN THE
FOLLOWING CIRCUMSTANCES :**

**EQUIPMENT & GRAFTS UNAVAILABLE
SURGEONS W/O ENDO & EVAR SKILLS
POOR ANATOMY FOR EVAR
NO PREPARATION FOR EMERG EVAR**

THAT IS WHY YOU ARE HERE

RAAAs THE GREAT MIMIC

- **URETERAL STONE**
- **DIVERTICULITIS**
- **MI**
- **PERFED ULCER**
- **OTHER**
 - **WHY; TIME COURSE**

OTHER POINTS

- **GATHER TEAM**
- **? CT & HOW**
- **SPEED TO OR**
- **THEN SLOW**
- **MAKE LIKE STD**

1037
PATIENTS

Collected World and Single Center Experience With Endovascular Treatment of Ruptured Abdominal Aortic Aneurysms

Frank J. Veith, MD,^{1*} Mario Lachat, MD,² Dieter Mayer, MD,² Martin Malina, MD,³ Jan Holte, MD,⁴ Manish Mehta, MD,⁵ Eric L. G. Verhoyen, MD, PhD,⁶ Thomas Larzon, MD,^{7*} Stefano Genoa, MD,^{1*} Gioacchino Coppa, MD,^{1*} Evan C. Lipsitz, MD,^{8,9} Nicholas J. Gargiulo, MD,^{10,11} J. Adam van der Vliet, MD,¹² Jan Wandersma, MD, PhD,¹³ Jacob Buth, MD,^{14*} W. Anthony Lee, MD,¹⁵ Giorgio Rinaldi, MD,^{16*} Gaetano Delo, MD,^{17*} Karthikeyan Kavinajan, MD,^{18*} Randy Moore, MD,^{19,20} Chao F. Song, MD,²¹ Neal S. Cayne, MD,¹ Mark A. Farber, MD,^{22*} Dieter Rattner, MD, PhD,²³ Roy K. Greenberg, MD,²⁴ Marc R. H. M. van Santvoort, MD, PhD,^{25*} Jan S. Bratnuvall, MD, PhD,^{26*} Carol B. Rockman, MD,¹ and Robert J. Hinchcliff, MD,^{27*} for the EAAA Investigators

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CENTERS

From the ¹Cleveland Clinic, Cleveland, OH; ²New York University Medical Center, New York, NY; ³Zurich University Hospital, Zurich, Switzerland; ⁴Malmö University Hospital, Malmö, Sweden; ⁵Albany Medical Center, Albany, NY; ⁶University Medical Center Groningen, University of Groningen, Groningen, The Netherlands; ⁷Örebro University Hospital, Örebro, Sweden; ⁸Modena University Hospital, Modena, Italy; ⁹Montefiore Medical Center, Bronx, New York, NY; ¹⁰University Medical Center Nijmegen, Nijmegen, The Netherlands; ¹¹Catharina Hospital, Eindhoven, The Netherlands; ¹²University of Florida, Gainesville, FL; ¹³University of Milan, Milan, Italy; ¹⁴Emory University, Atlanta, GA; ¹⁵Peter Loughheed Center, Calgary, Canada; ¹⁶Belfast City Hospital, Belfast, United Kingdom; ¹⁷University of North Carolina, Chapel Hill, NC; ¹⁸University of Nuremberg, Nuremberg, Germany; ¹⁹University of Cologne, Cologne, Germany; and ²⁰University of Nottingham, Nottingham, United Kingdom.

21%
30-DAY MORTALITY

EUROPE

44 Countries: 27 European Union + 17 others

Specialty status

Mono-specialty

Subspecialty

No specialty (within GS)



Total training years: 5 -12 years

Endovascular experience

- Integrated in curriculum
- Provided through attachment in IR
- Not mandatory but with co-operative program IR

First EVAR for RAAA



ARISTOTLE
UNIVERSITY
OF THESSALONIKI

- The first report was published by the Nottingham group in December 1994 (Yusuf et al. Lancet 1994)
- the first actual case was performed by the Montefiore group in April 1994 and reported in 1995 (Marin et al. Ann Surg 1995)

Future directions

- ✓ Best management of Abdominal Compartment Syndrome
- ✓ Chimney technique
- ✓ Overlay techniques



CONCLUSION

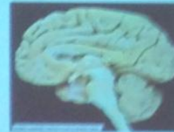
- ✓ EVAR has a positive impact on management of RAAA
- ✓ Nevertheless, it remains to be proved that EVAR is not only a selection bias
- ✓ Ongoing trials should determine the good candidates for EVAR



Fluid Management

Limitations of Permissive Hypotension

Brain perfusion:
autoregulation works between 50-100mmHg
risk of ischemic stroke in cerebral vascular disease



Coronary perfusion:
low blood pressure = less O2 consumption
risk of myocardial infarction in coronary artery disease



Kidney perfusion:
good ischemic tolerance
high risk of failure due to concomitant hits:
contrast, rhabdomyolysis



Monitor:



Anesthesia for rAAA

Conclusions:

- when ever possible under local anesthesia
- at least until the rupture is sealed!

- accept hypovolemia and hypotension



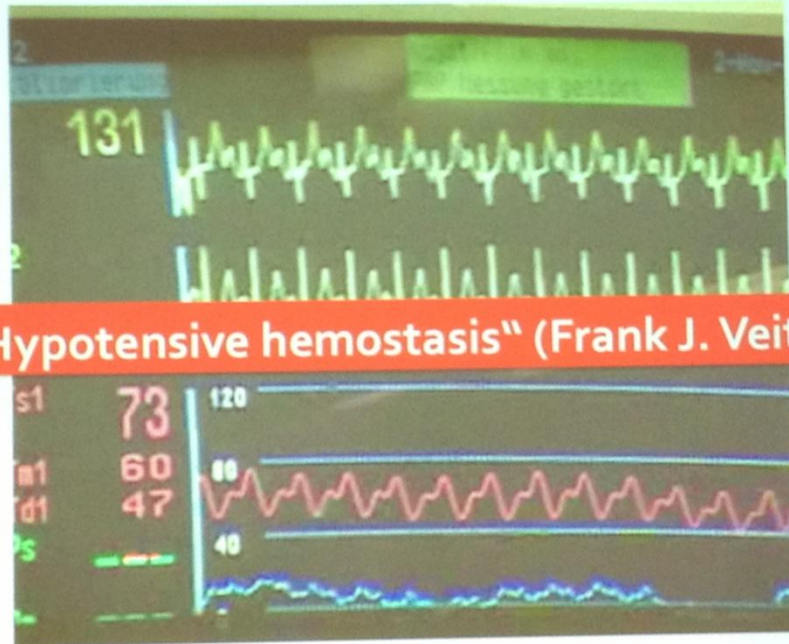
Summary RF

RF +

- True rupture
 - Intra> retroperitoneal
- CPR
- Level/type of XC
 - RF- (90-day mortality)
- Massive transfusion
- ACS
 - No decompression

RF-

- Time to treatment
 - Transportation type
 - Imaging type
- Coronary artery disease
- Peripheral OD
 - RF+ (90-day mortality)
- «Hostile abdomen»



„Hypotensive hemostasis“ (Frank J. Veith)

Use of Fogarty Catheter Tamponade for Ruptured Abdominal Aortic Aneurysms

ARMEINDO G. NO AND EDWARD C. SCHMER

A sterile rapid absorbable fibrinolytic gel in the treatment of ruptured abdominal aortic aneurysms by the use of a Fogarty no. 8 French catheter is presented. In five cases at high surgical risk, further bleeding was controlled by occluding the aorta proximal to the site of the ruptured aneurysm, making operative aneurysm repair easier. Four of the five patients survived the procedure. The technique of inserting the catheter via a left axillary arteriotomy and the solutions in certain technical difficulties are discussed.

Technique

Transversely introduction of a balloon catheter under local anesthetic affords proximal control of hemorrhage of ruptured abdominal aortic aneurysm. This method was first described in 1964 by Heimbecker [2] and 8 years later by Smith [3]. In both reports, the balloon catheter was advanced directly to the aorta. Fluoroscopy was used by Heimbecker only to localize the position of the balloon catheter in the midabdomen. We believe that fluoroscopy is essential for rapid

1977

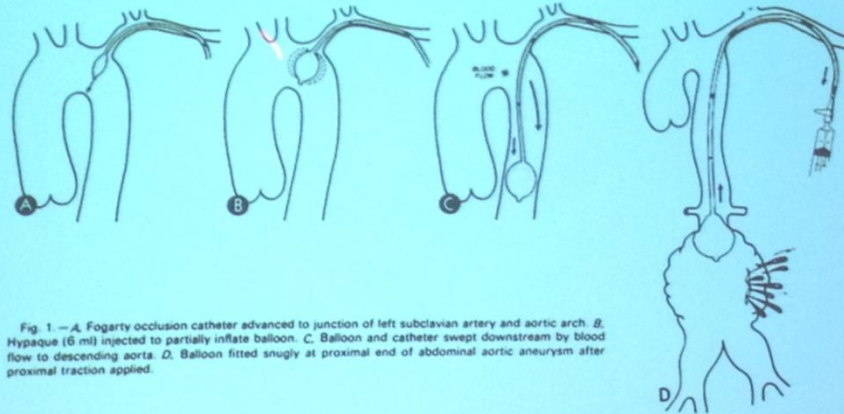
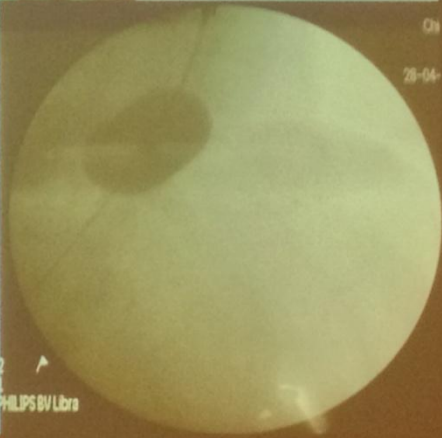
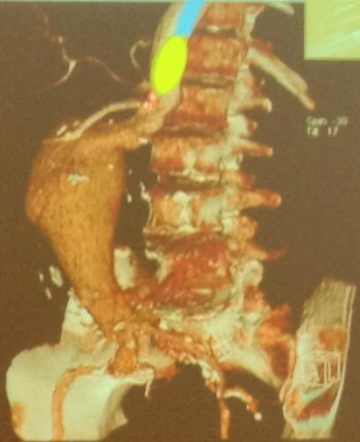


Fig. 1.—A. Fogarty occlusion catheter advanced to junction of left subclavian artery and aortic arch. B. Hypaque (6 ml) injected to partially inflate balloon. C. Balloon and catheter swept downstream by blood flow to descending aorta. D. Balloon fitted snugly at proximal end of abdominal aortic aneurysm after proximal traction applied.



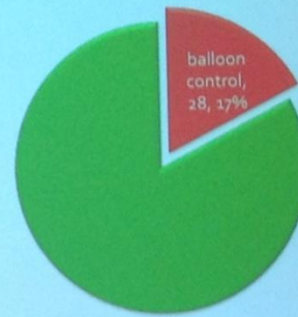
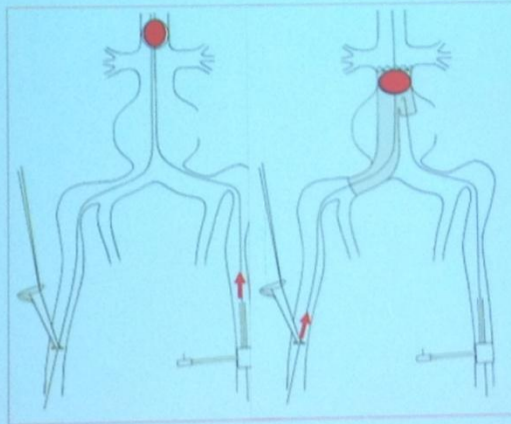
PHILIPS BV Libra

Balloon control

Unstable hemodynamics



Transfemoral balloon technique



- *short periode of visceral ischemia, but*
↑ **coronary and cerebral circulation**
↓ **blood loss**
↓ **retroperitoneal hematoma**

Pitfalls

Aortic disease

- Embolization
- Aortic rupture/dissection
- Balloon rupture

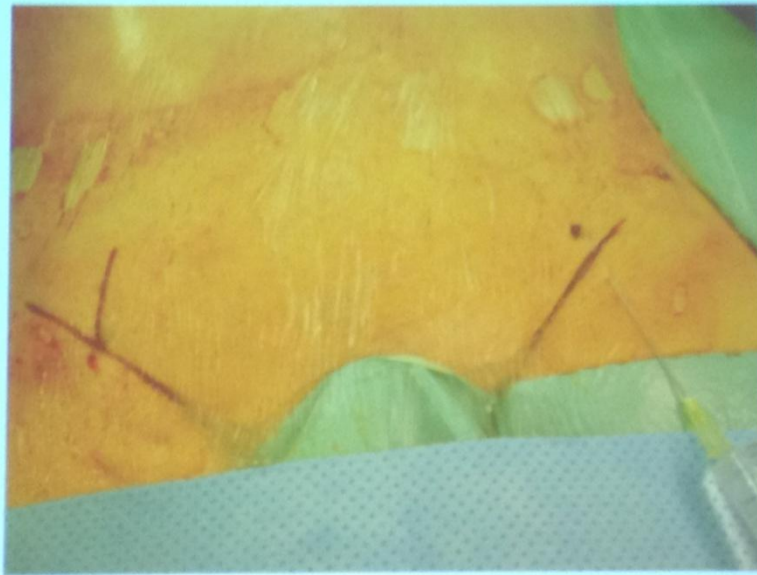
Technical failure

- Dislocation

Time limitation

- Ischemia-reperfusion after 30 min!

Lidocain 0.5% (30-60 ml)

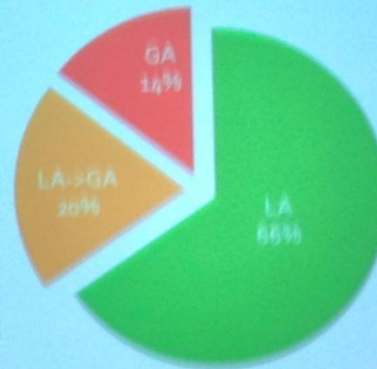


„LA whenever possible“

Unstable hemodynamics



Local anaesthesia



86% of RAAA sealed in LA + analgesiation

Anatomy 1998-2009

Proximal neck

- length < 5mm
- diameter > 30mm
- kinking > 90°

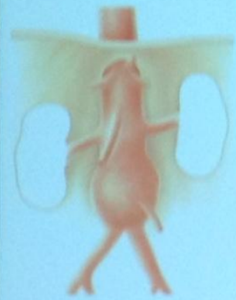
Distal access

- bilaterally occluded/
stenosed iliacs

Exclusion
criteria for
REVAR
UHZ



Anatomy today



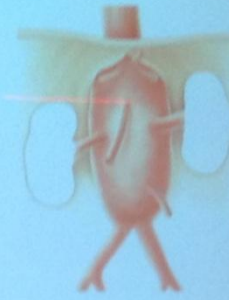
Infrarenal



Juxtarenal



Suprarenal

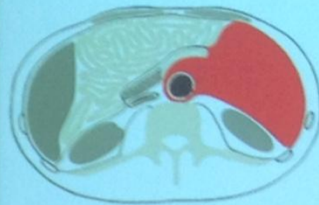


Abschnitt IV



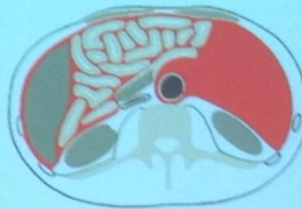
Type of rupture

contained retro-peritoneal rupture



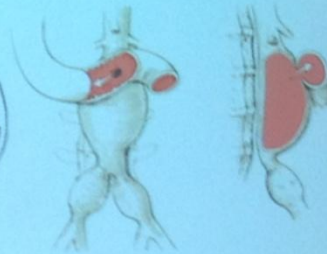
68%

free intra-peritoneal rupture



27%

aorto-duodenal fistula



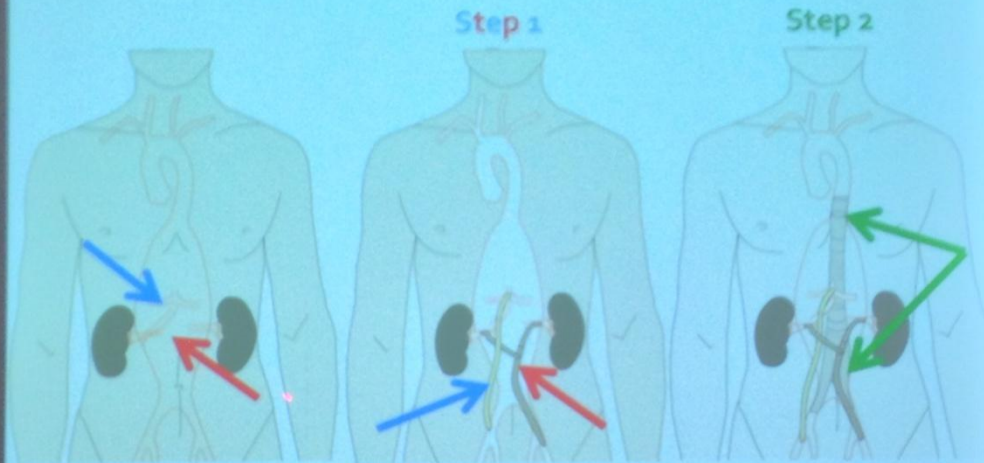
5%

UHZ: REVAR for RAAA 1998-2012 (n=161)

Questions of interest

- Timing
 - Immediate vs delayed
- Technique
 - COS vs Hybrid vs CEVAR
- Device
 - Bifurcated vs Uni-iliac
- Tactics
 - Damage control vs definitive

HYBRID (TAAA)



Visceral arteries

Renal arteries

Stentgraft

Challenges of „Debranching“

Multiple anastomosis (up to 13, mean 6 to 8)

- Ischemia-reperfusion of all abdominal organs

Long lasting interventions

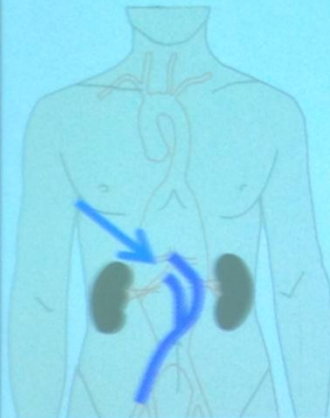
- Homeostasis generally disturbed
- Temperature often below 34 to 35° C
- Coagulation often disturbed
- Fluid balance mostly highly positive
- ...

Polymorbid patients

- Negative selection, since regarded less invasive

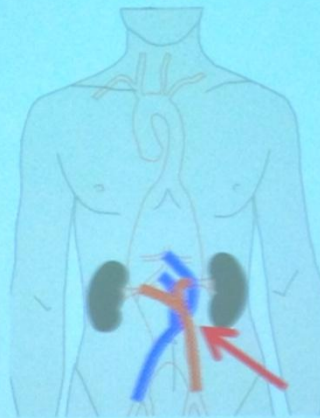
HYBRID (TAAA)

Step 1



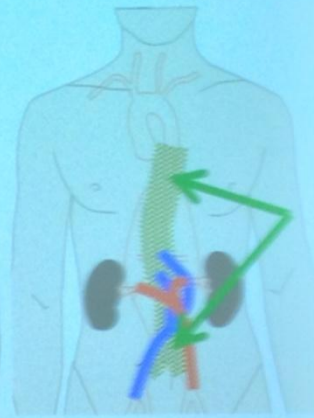
Visceral arteries

Step 2



Renal arteries

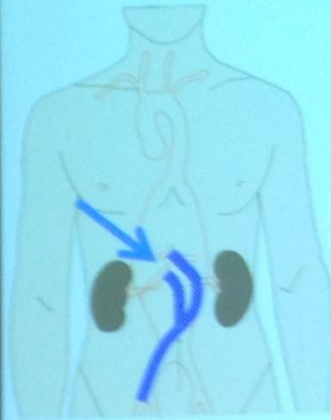
Step 3



Stentgraft

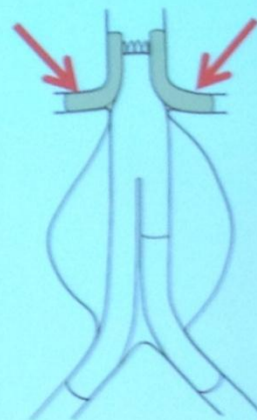
HYBRID (TAAA) 2010 – Half-Half Technique

Step 1



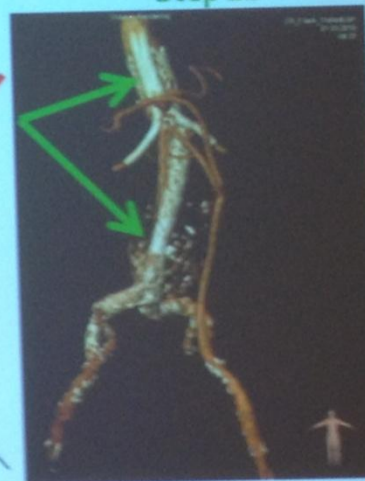
Visceral arteries

Step 2a



Renal arteries

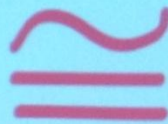
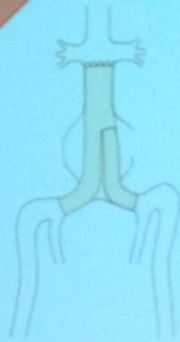
Step 2b



Stentgraft

Device

• Bifurcated vs Uni-iliac

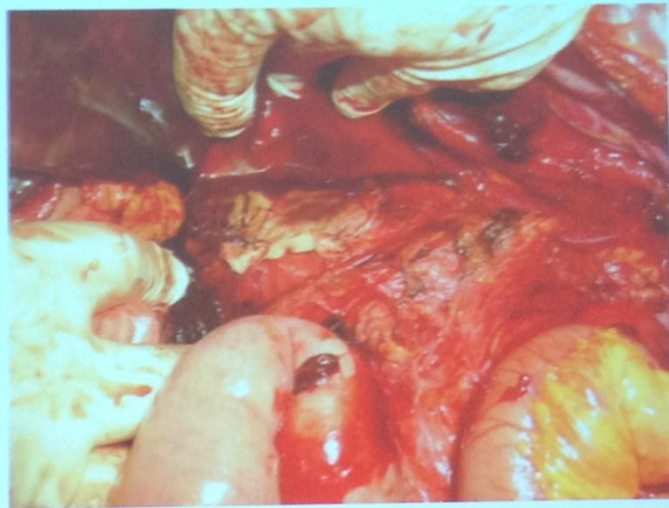


- BSG, when routinely used
 - better long-term results
 - „Business as usual“

- AUI SG allows
 - less experienced teams to treat rAAA by REVAR
 - to extend the treatment to patients with unilateral iliac stenosis or occlusion



• Damage control vs definitive



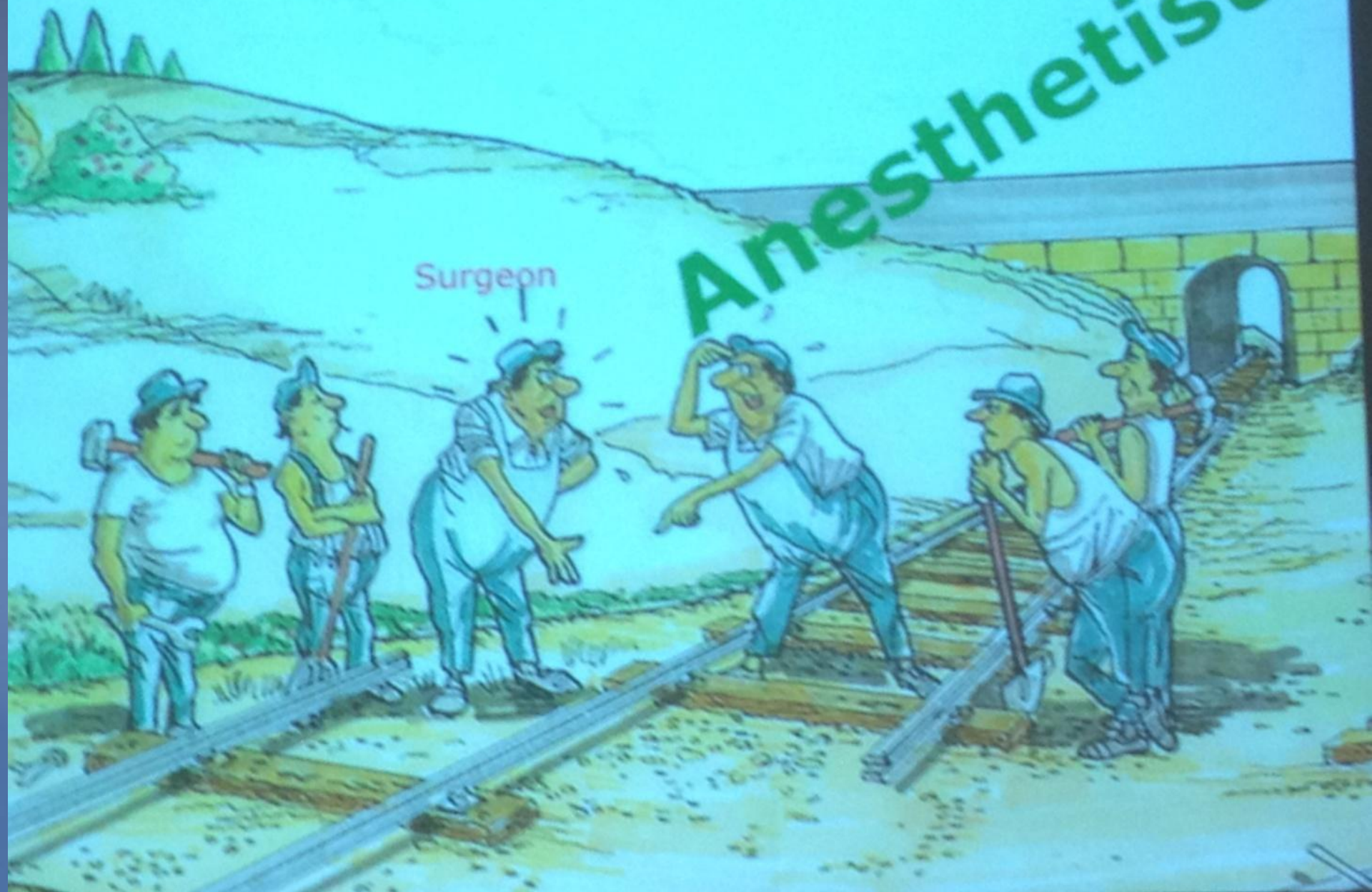
Abdominal Compartment Syndrome kills!

Author	Year	Treatment	n=	ACS n= (%)	Mortality	
					ACS -	ACS +
Starnes	2009	COS EVAR	24	6 (25)	44%	83%
			27	2 (7)	16%	50%
Mayer	2009	EVAR	103	27 (22)	9%	26%
Mehta	2005	EVAR	30	6 (20)	33%	57%
Papavassilou	2003	COS	22	6 (27)	25%	100%
Foy	2003	COS	21	4 (20)		5%
Rasmussen	2003	COS	125	45 (33)	9%	56%
Ophir-Mager	1997	COS	28	8 (21)	50%	75%
Figueras	1989	COS	100	4 (4)	First description	

Team Work

Anesthetist

Surgeon



REVAR TEAM UHZ 1998-2012



Radiologists

- Thomas Pfammatter
- Ulrich Blum
- Paul Hilliker
- Ursula Wolfensberger
- Roger Pfiffner
- Lukas Mechelhammer
- Susanne Abderhalden
- Michael Glöck
- Gilbert Puppe



Surgeons

- Hans Lehner
- Jörg Schmidt
- Andreas Kunz
- Michael Szente Varga
- Stefan Mayer
- Jean-Marc Geier
- Markus Wilhelm
- Alberto Weber
- Simone Hofer
- Stefan Brand
- Oliver Graubitz
- Felice Pecorelli
- Barbara Tümm

INTERVENTIONAL VASCULAR SPECIALISTS (N=22)

30-d MORTALITY 1998-2011

Overall

Operative

ALL
PTS!

EVAR
& Open

EVAR

Open

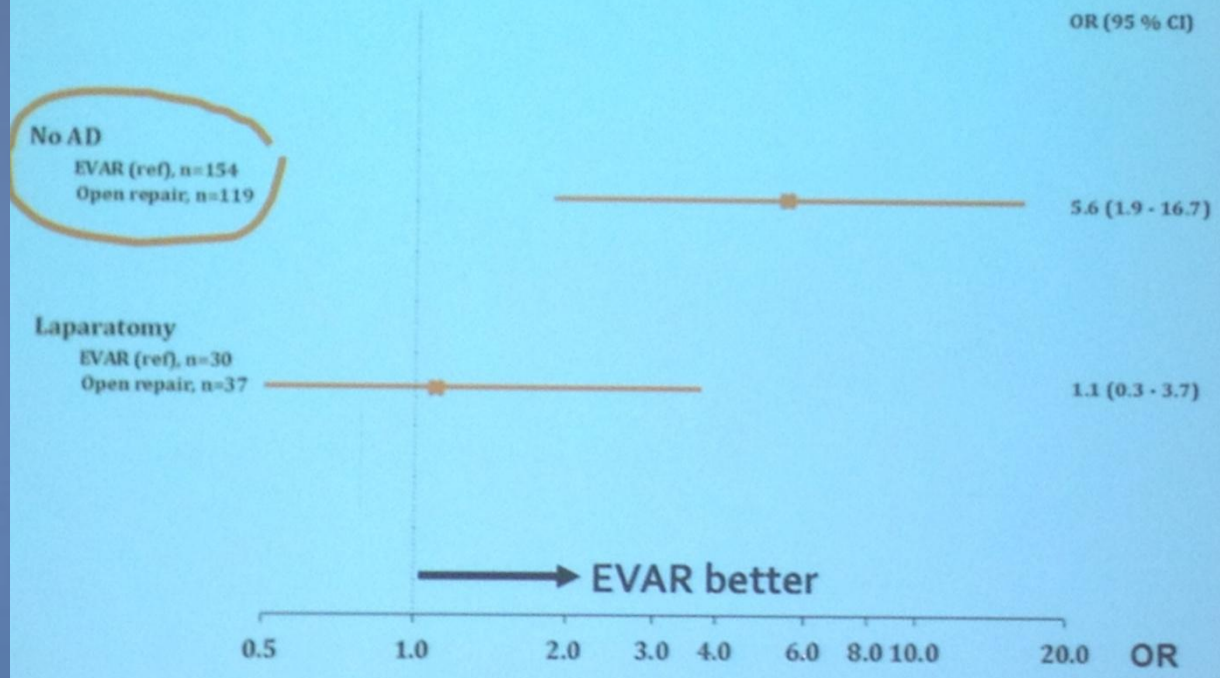
33%

25%

18%*

37%

Adjusted odds ratios (OR) with 95 % confidence intervals for 30 days mortality between Open repair and EVAR



Total cohort incl. medically treated

1998-Apr 2009
(n=400)

May 2009-2011
(„EVAR ONLY“, n=73)

Mortality

33%

Mortality

27%

MED TX

10%

MED TX

4%