Not all aneurysms are the same

Discussing risks with my patients on aortic progression/rupture/dissection

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AAA

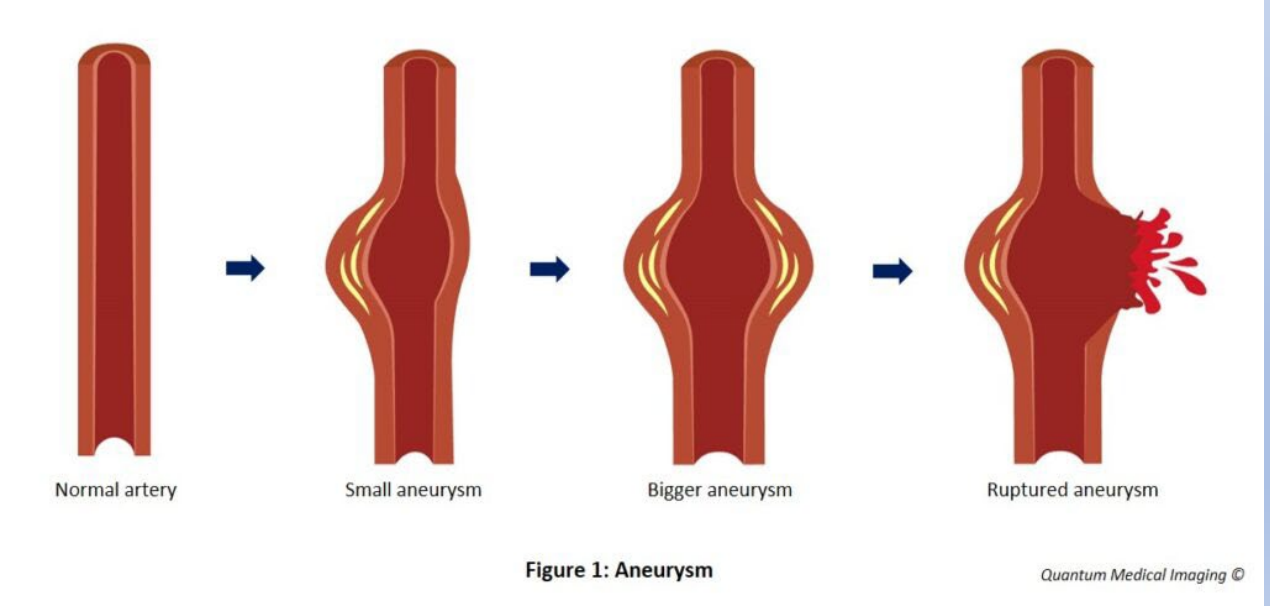
- Aortic aneurysmal progression
- Aneurysmal Rupture
- Aortic Dissection

Discussing risks with my patients

- What is an abdominal aortic aneurysm?
- Why do they have one?
- When do we operate on it?
- How do we fix it?
- What comes next?

What is an aneurysm?

- Common definition
- When the artery dilates to 150% of the normal size
- 3 cm in the infrarenal aorta



Why do they have one?

Increased Risk

- Genetic predisposition
- Age
- Men
- Atherosclerosis

- Smoking history
- Hypertension
- BMI

Decreased Risk

- Diabetes
- Eating fruits & veggies 3 x week
- Exercising at least 1 x week
- Race – Asian, African American, Hispanic

Smoking history and AAA

Current smokers 7.6 x more likely

Ex smokers 3 x more likely

More than 90% of AAA pts have smoked

AAA is second only to lung cancer in epidemiologic association to cigarette smoking

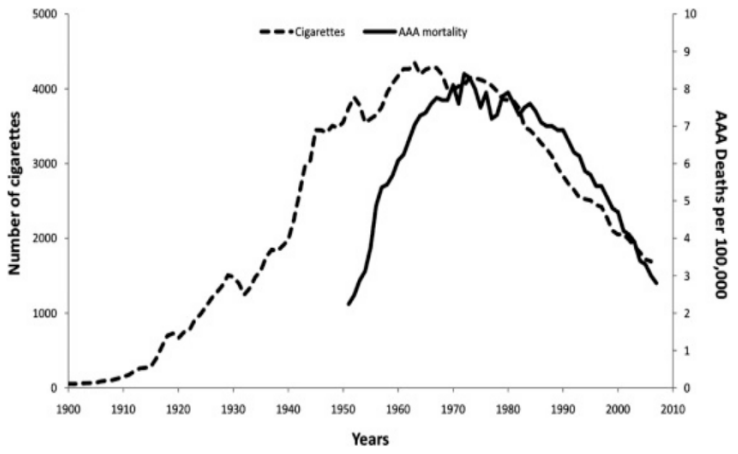


Fig 1 The annual adult per capita cigarette consumption and age-adjusted abdominal aortic aneurysm (*AAA*) deaths per 100,000 white men by year in the United States.

From Lederle FA. The rise and fall of abdominal aortic aneurysm. Circulation 2011;124:1097-9.

The association between cigarette smoking and abdominal aortic aneurysms

Teun B.M. Wilmink, MD, FRCS, Clive R.G. Quick, MS, FRCS, and **Nicholas E. Day, PhD,** *Cambridge and Huntingdon, United Kingdom*

Purpose: The purpose of this study was to investigate the precise effect of smoking, duration of smoking, and cessation of smoking on the risk of the development of an abdominal aortic aneurysm (AAA).
Methods: A nested case control study was carried out in a population-based screening program for men over the age of 50 years. Smoking data were collected by questionnaire, and serum levels of cotinine were used as an objective measure of nicotine exposure.
Results: Data of 210 cases and 237 control individuals were analyzed. Current smokers were 7.6 times more likely to have an AAA than nonsmokers (95% confidence interval, 3.3%-17.8%). Exsmokers were 3.0 times more likely to have an AAA than nonsmokers (95% confidence interval, 1.4%-6.4%). Duration of smoking was significantly associated with an increased risk of AAA, and there was a clear linear dose response relationship with the duration of smoking; each year of smoking increased the relative risk of AAA by 4% (95% confidence interval, 2%-5%). In contrast, the effect of the amount smoked disappeared when an adjustment was made for the duration of smoking. After the cessation of smoking, there was a very slow decline in the risk of the occurrence of an AAA. Smoking was associated with a higher relative risk of a small aneurysm than a large aneurysm. Serum cotinine levels were higher in men with a small aneurysm than in men with a large aneurysm. Cotinine levels were similar in expanding aneurysms and stable aneurysms.
Conclusion: The duration of exposure rather than the level of exposure appears to determine the risk of the development of an AAA in men older than 50 years. The slow decline of risk after the cessation of smoking and the higher relative risk for small compared with large aneurysms suggest that smoking is an initiating event for the condition.
(J Vasc Surg 1999;30:1099-1105.)

When do we Fix it?
Risks of Rupture for AAA

- Twelve-Month Risk of Rupture Based on Abdominal Aortic Aneurysm Diameter
- AAA Diameter (cm) Rupture Risk (%)
- 3.0–3.9 0.3
- 4.0–4.9 0.5–1.5
- 5.0–5.9 1–11
- 6.0–6.9 11–22
- >7 >30

- AAA, Abdominal aortic aneurysms.

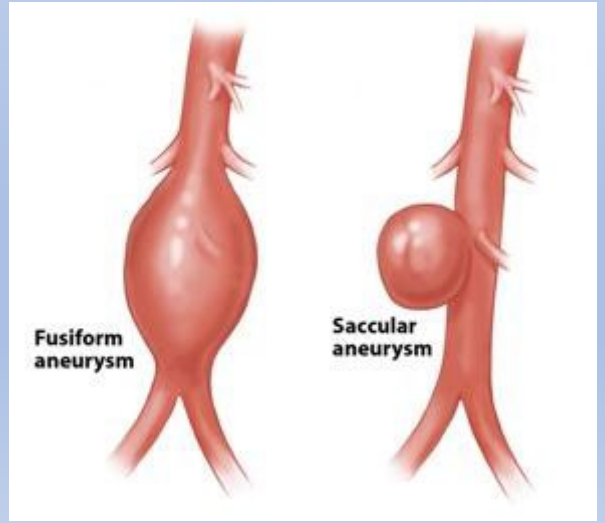
Expected Progression of the Aortic Aneurysm

- Normal or Expected Growth – Follow with imaging
- Up to 1 cm per year based on US or CT measurements.
- Accelerated Growth – Plan repair no matter the size
- If > 0.5 cm in 6 months or >1.0 cm in 1 yr

Types of Aortic Aneurysms May Change Criteria for Repair

Normal Criteria for Repair

- Fusiform – Inflammatory/genetic



Accelerated Repair (not size restricted)

- Saccular – Inflammatory/genetic or Infectious
- Pseudoaneurysm – Traumatic/Infectious
- Mycotic – Infectious

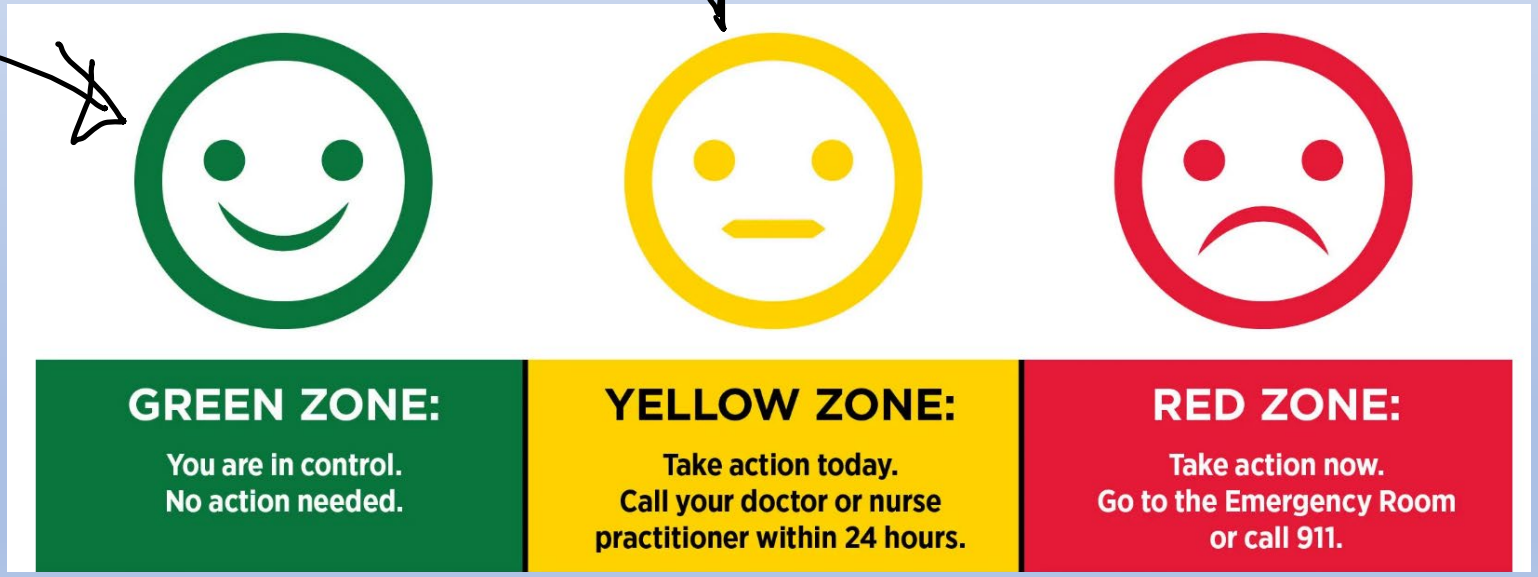
When do we fix it?

- Best case – Before it ruptures!

Symptomatic

Ruptured

Before



Risk Score for Prediction of Mortality After Repair of Ruptured Abdominal Aortic Aneurysm (rAAA)

Retrospective, single center study

303 patients with rAAA

Preoperative Variables Predicting Mortality

Age > 76 years

OR 2.1

Systolic BP < 70 mmHg

OR 2.7

Se Creatinine > 2.0mg/dL

OR 3.7

pH < 7.2

OR 2.6

Risk Score (N. of Variables Present)	30 Day Mortality
1	22%
2	69%
3	80%
4	100%

JVS Journal of Vascular Surgery
Official Publication of the Society for Vascular Surgery

Garland et al. *J Vasc Surg October 2018*

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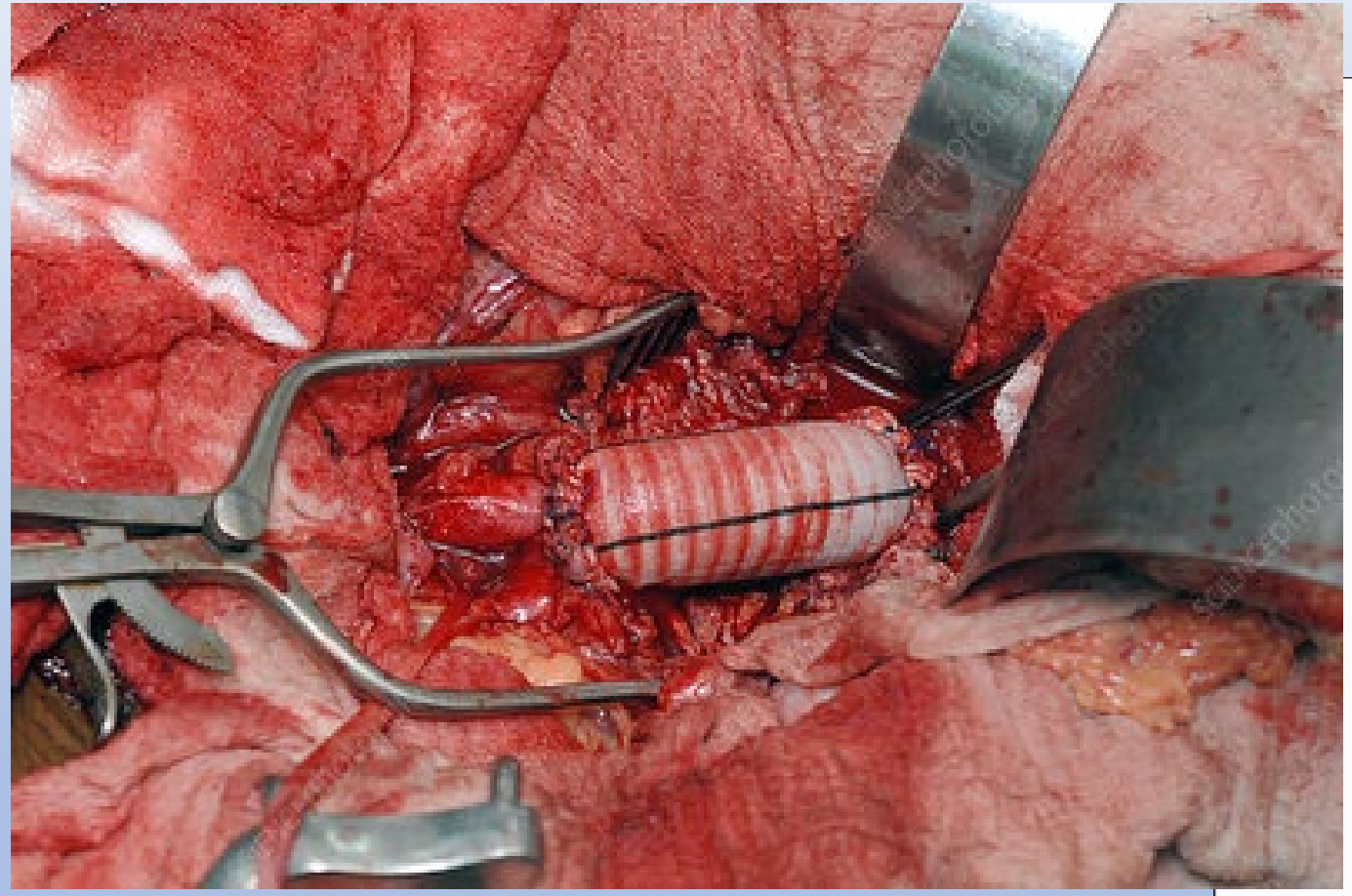
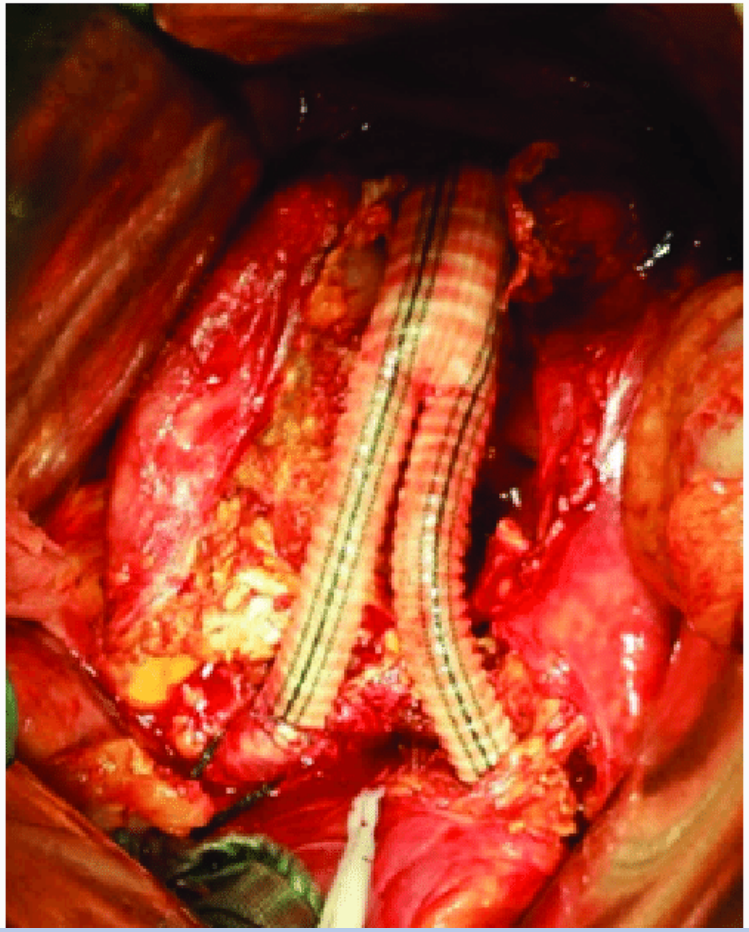
How do we fix it?

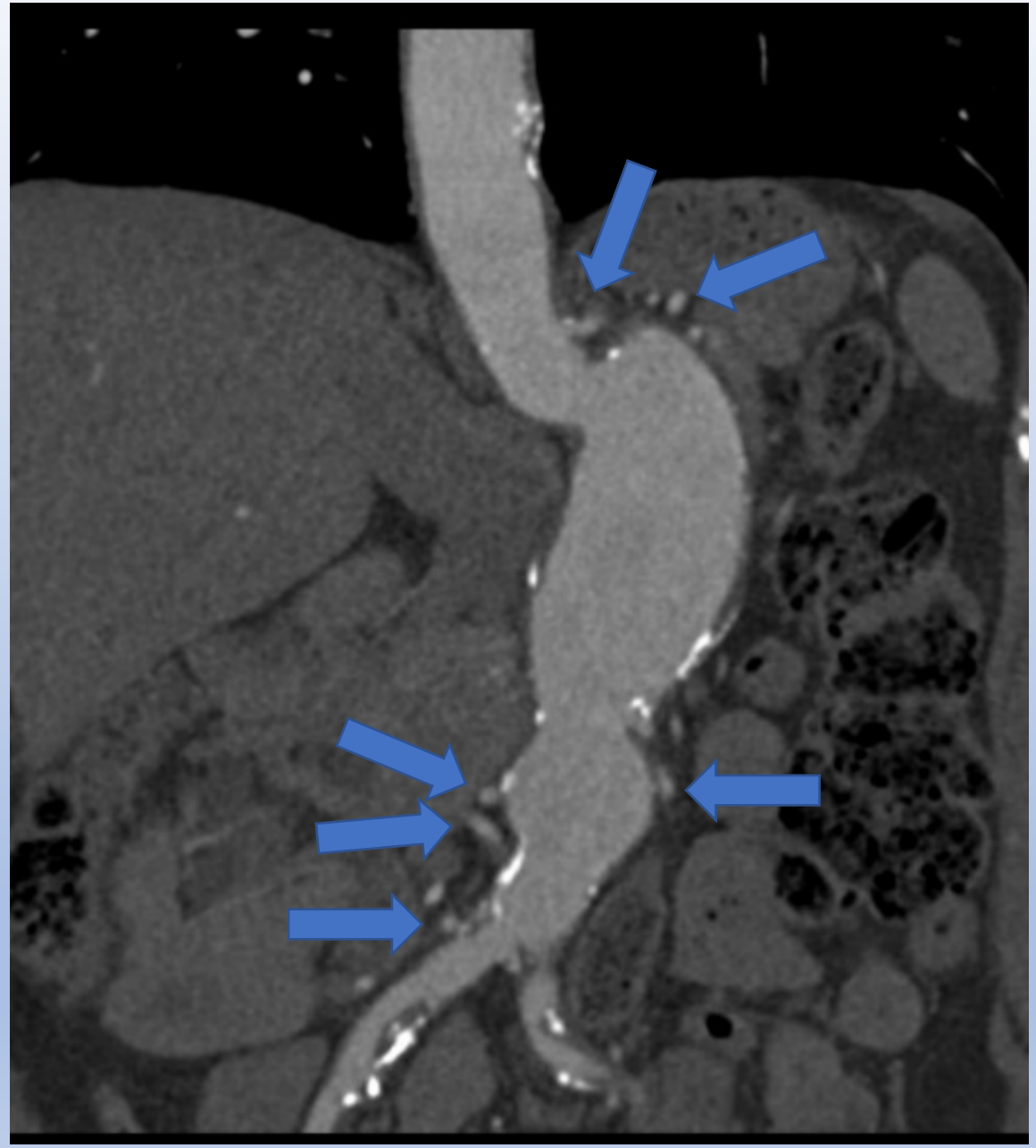
- Open repair – Not candidate for endovascular repair
- Endovascular repair – Majority of cases
- Don’t – Palliative care consult

Open Repair





Not Endo Candidate



Training Programs for AAA

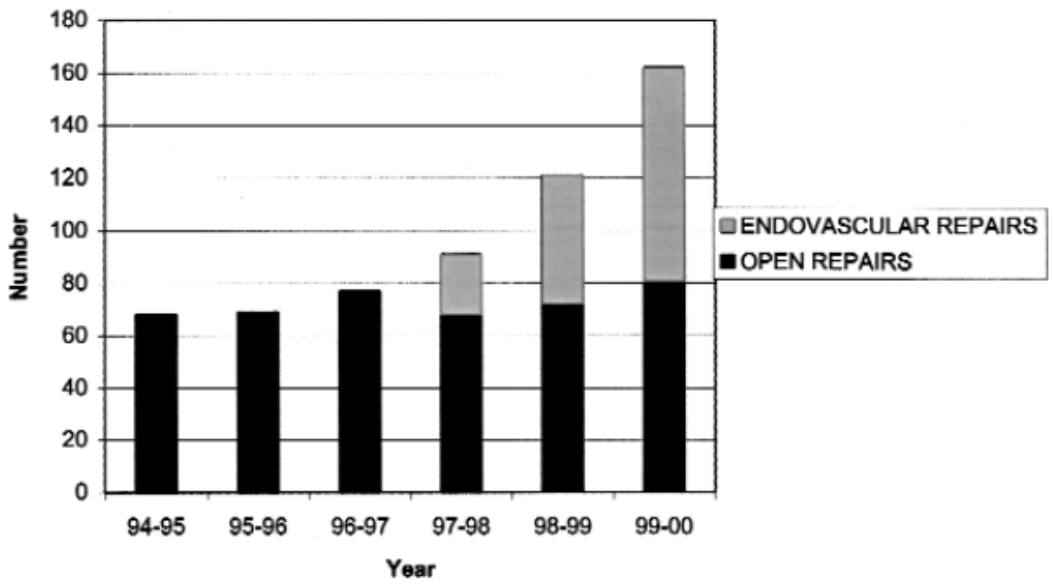


Fig 1. Total number of aneurysms performed by vascular fellows per year.

Impact of endovascular repair on open aortic aneurysm surgical training

Frank R. Arko, MD, W. Anthony Lee, MD, Bradley B. Hill, MD, Cornelius Olcott IV, MD, E. John Harris, MD, Ronald L. Dalman, MD, Thomas J. Fogarty, MD, and **Christopher K. Zarins, MD,**
Stanford, Calif

Purpose: **The purpose of this study was to determine the impact of an endovascular stent-graft program on vascular training in open aortic aneurysm surgery.**
Methods: **The institutional and vascular surgery fellow experience in aortic aneurysm repair during a 6-year period was reviewed. The 3-year period before introduction of endovascular repair was compared with the 3-year period after introduction of endovascular repair. All patients undergoing abdominal aortic aneurysm (AAA) or thoracoabdominal aortic aneurysm repairs were entered prospectively into a vascular registry and retrospectively analyzed to evaluate the changing patterns in aortic aneurysm treatment and surgical training.**
Results: **Between July 1994 and June 2000, a total of 588 patients with AAA or thoracoabdominal aneurysms were treated at Stanford University Medical Center. There were 296 (50%) open infrarenal AAA repairs, 87 (15%) suprarenal AAA repairs, 47 (8%) thoracoabdominal aneurysm repairs, and 153 (26%) endovascular stent-grafts. The total number of aneurysms repaired per year by vascular fellows before the endovascular program was 71.3 ± 4.9 (range, 68-77) and increased to 124.7 ± 35.6 (range, 91-162) after introduction of endovascular repair ($P < .05$). This increase was primarily caused by the addition of endovascular stent-graft repairs by vascular fellows (51.0 ± 29.0/year [range, 23-81]). There was no change in the number of open infrarenal aortic aneurysm repairs per year, 53.0 ± 6.6 (range, 48-56) before endovascular repair versus 47.0 ± 1.7 (range, 46-49) after (P = not significant). There was a significant increase in the number of suprarenal AAA repairs per year by vascular fellows, 10.0 ± 1.0 (range, 9-11) before endovascular repair compared with 19.0 ± 6.5 (range, 13-26) after ($P < .05$). There was no change in the number of thoracoabdominal aneurysm repairs per year between the two groups, 8.0 ± 3.0 (range, 4-11) before endovascular repair compared with 7.6 ± 2.3 (range, 5-9) after.**
Conclusions: **Introduction of an endovascular aneurysm stent-graft program significantly increased the total number of aneurysms treated. Although the number of open aneurysm repairs has remained the same, the complexity of the open aneurysm experience has increased significantly for vascular fellows in training. (J Vasc Surg 2001;34:885-91.)**

The Impact of Endovascular Repair of Abdominal Aortic Aneurysms on Vascular Surgery Training in Open Aneurysm Repair

Nadin Elsayed,[1] Maryam A. Khan,[1] Isaac Naazie,[1] Jaideep Das Gupta,[2] Randall De Martino,[3] Mahmoud B. Malas[2]. [1]University of California San Diego School of Medicine, San Diego, Calif; [2]University of California San Diego, San Diego, Calif; [3]Mayo Clinic, Rochester, Minn

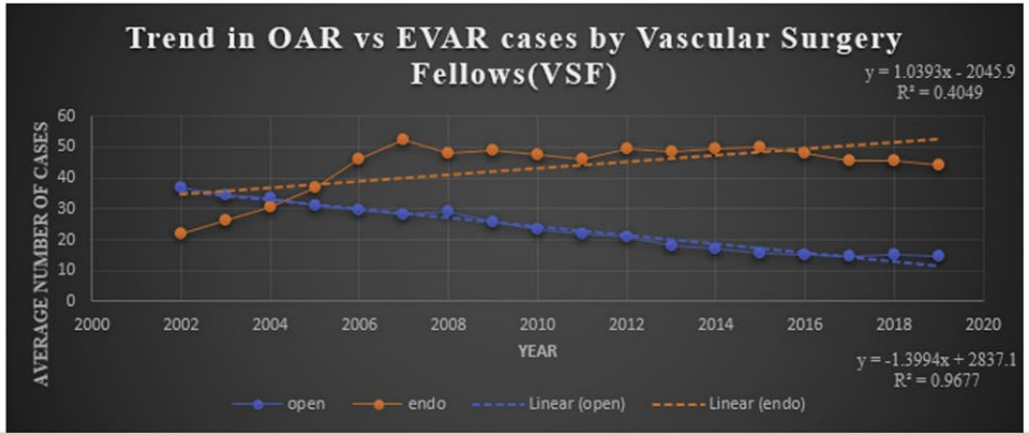


Fig 1. Mean numbers of cases logged by vascular surgery fellows (VSF) for total open AAA repair (OAR) and endovascular AAA repair (EVAR) procedures from 2002 to 2019. *AAA*, Abdominal aortic aneurysm.

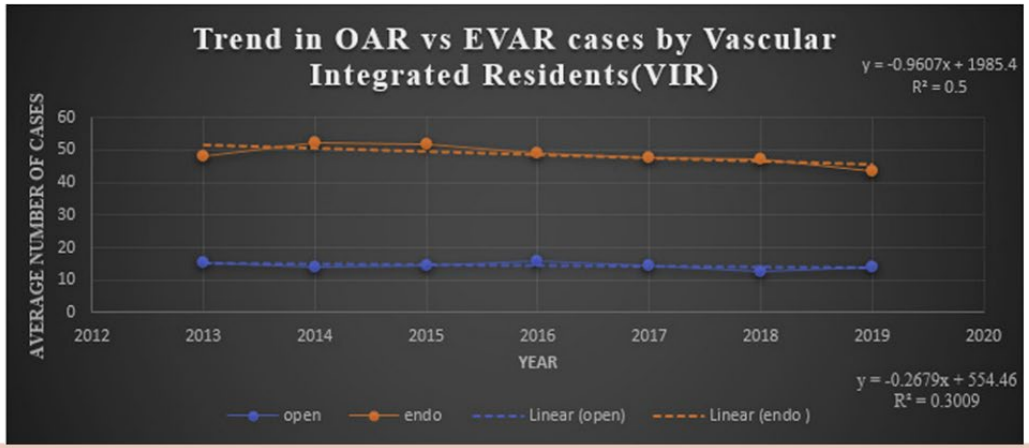
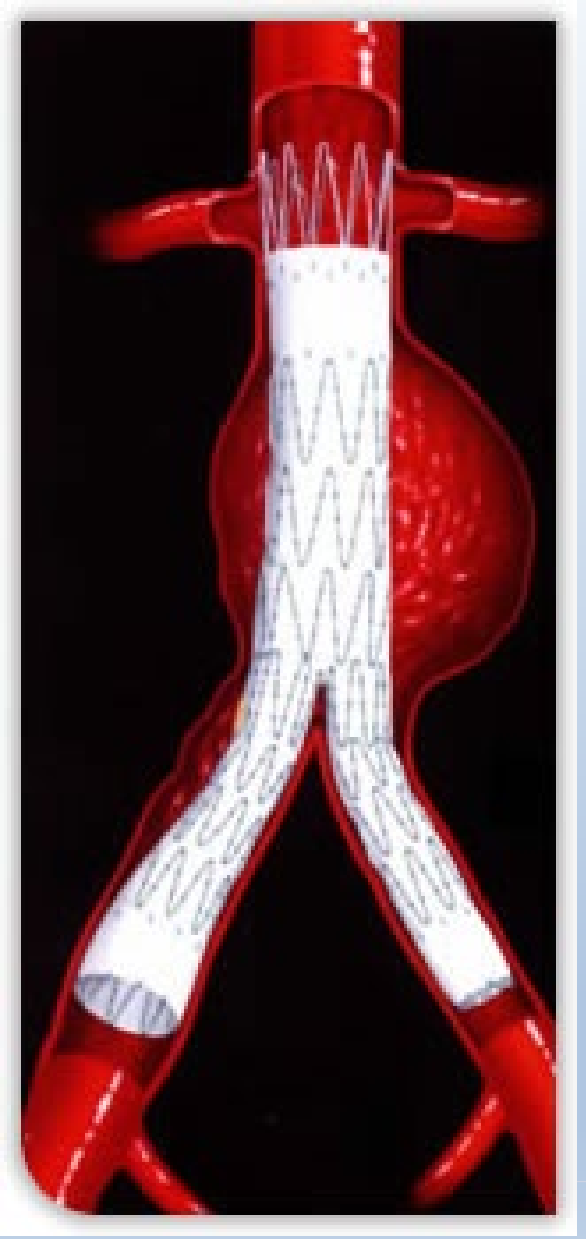


Fig 2. Mean numbers of cases logged by vascular surgery residents for total open AAA repair (OAR) and endovascular AAA repair (EVAR) procedures from 2012 to 2019. *AAA*, Abdominal aortic aneurysm.

Endovascular Aneurysm Repair

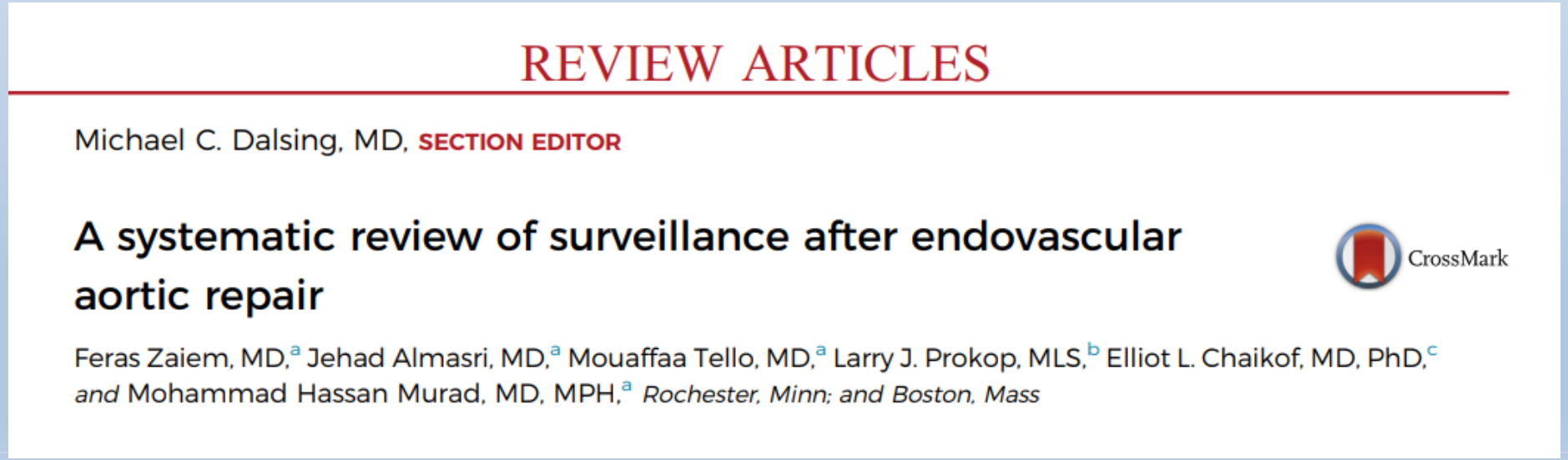
- Many advantages
- Decreased blood loss, OR time, morbidity and mortality
- Patient preference



What Comes Next?

- Follow up after endovascular surgical repair 1, 6, 12, 24, 36, 48, and 60 months

- US, CTA or MRI with contrast are all appropriate follow up methods – However, CTA is the gold standard if any concerns arise with suspicion of endoleaks or endotension



REVIEW ARTICLES

Michael C. Dalsing, MD, SECTION EDITOR

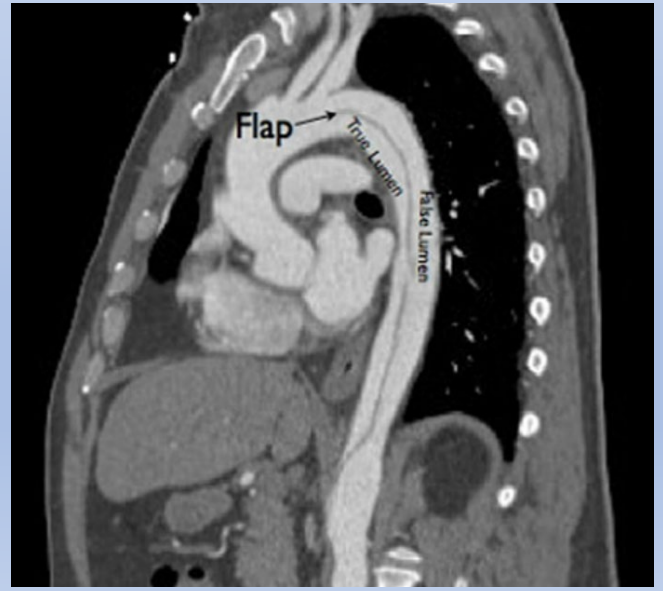
A systematic review of surveillance after endovascular aortic repair

Feras Zaiem, MD,[a] Jehad Almasri, MD,[a] Mouaffaa Tello, MD,[a] Larry J. Prokop, MLS,[b] Elliot L. Chaikof, MD, PhD,[c] *and* Mohammad Hassan Murad, MD, MPH,[a] *Rochester, Minn; and Boston, Mass*

Dissection

- Could be a whole talk
- Aortic dissection - a tear in the innermost layer of the aortic wall (intima) that results in high pressure flow of blood between the layers of the aorta, creating a true and false lumen
- Differences to treat acute dissection vs chronic

- For chronic dissection with aneurysmal degeneration – size of aneurysm or rate of change (> 1 cm per year growth) dictates when to repair



Thank you!

- And one more thing…

- With the VSIR increase in Women in VS 56%
- From 2007 to 2016 from 221 female fellows to 501

EDUCATION CORNER

From the Western Vascular Society

Integrated residency is associated with an increase in women among vascular surgery trainees

Susanna Hewon Shin, MD, Gale L. Tang, MD, *and* Sherene Shalhub, MD, MPH, *Seattle, Wash*

ABSTRACT

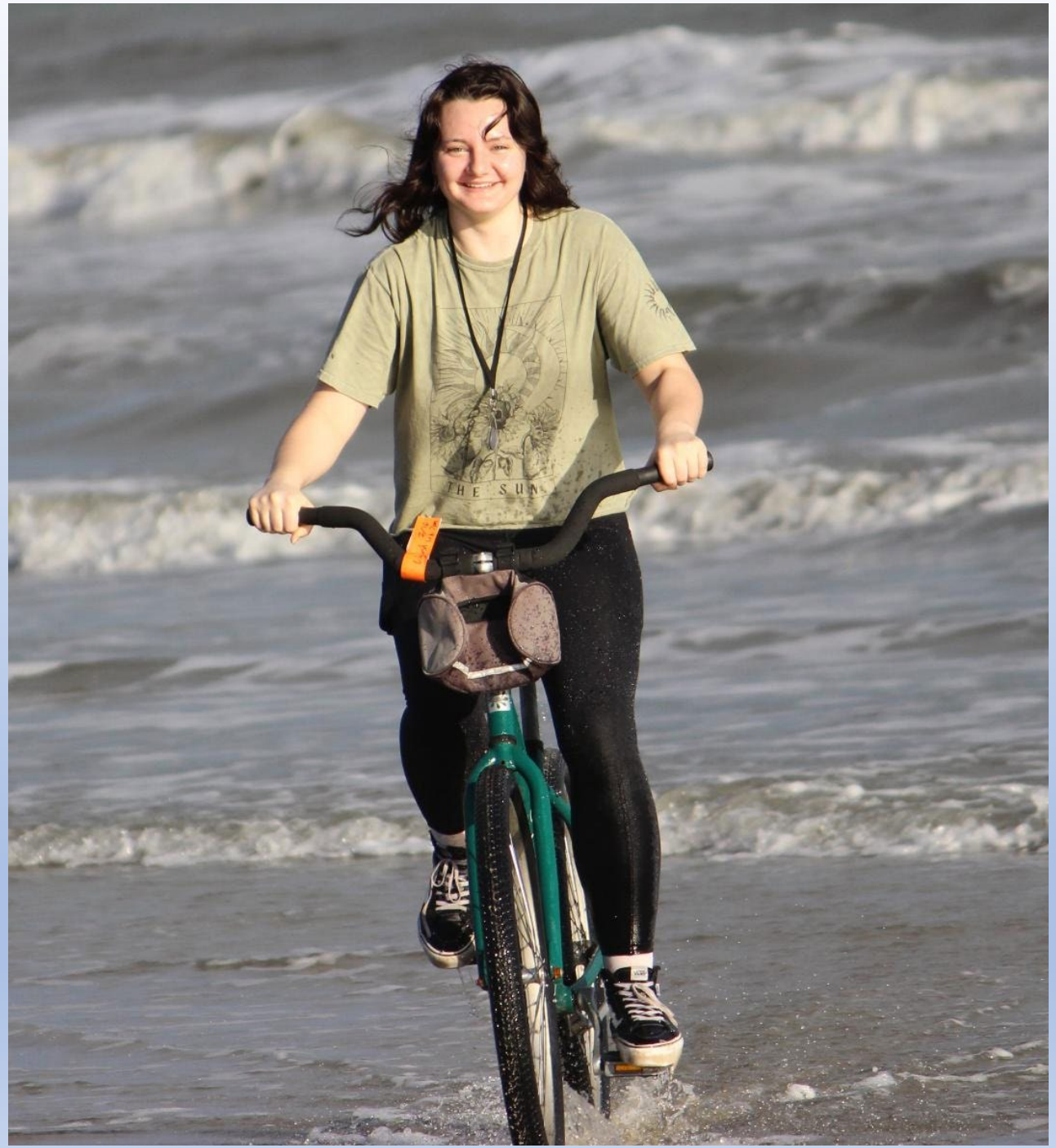
Background: During the past decade, the proportion of women within graduate medical education has increased. Correspondingly, the proportion of women in almost every specialty has increased, including surgical specialties. We sought to evaluate the effect of establishing vascular surgery integrated residencies (VSIRs) on the proportion of women in vascular surgery training programs.

Methods: Resident data were obtained from the Accreditation Council for Graduate Medical Education (ACGME) Data Resource Book for the academic years 2007 to 2016. Data were collected on overall ACGME residency numbers as well as on the following surgical subspecialties: vascular, general, thoracic, neurologic, orthopedic, otolaryngologic, and urologic surgery. The number and proportion of women per year in VSIRs and vascular surgery fellowships were compared with those in the other surgical specialties.

Results: During the study period, the proportion of women in ACGME-accredited residency programs increased from 0.41 (n = 43,695/107,851) to 0.44 (n = 57,130/129,720) of residents. Since the advent of the VSIR, the number of trainees within vascular surgery has increased by 56% from 221 to 501 trainees. The proportion of women in vascular surgery training programs has increased from 0.12 (n = 27/221) to 0.33 (n = 164/501) of trainees. This increase during the 9-year study period was greater than in any other surgical subspecialty and greatest within the VSIR. Compared with fellowship training programs, integrated surgical training programs within the same subspecialty had a higher proportion of women, although variability between surgical subspecialties remained notable.

Conclusions: Although it is lower than the proportion of women within all graduate medical education training programs, an increasing proportion of women have entered vascular surgery training during the study period. This appears to be related to the introduction of VSIRs and exceeds the proportion of women entering almost all other surgical subspecialties at a rate of change faster than in all other surgical subspecialties. Further work to understand surgical specialty preferences and choice of careers after training is warranted. (J Vasc Surg 2020;71:609-15.)

Keywords: Women; Vascular surgery; Integrated residency


THE SUN

And it’s a wrap!