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Can We Validate New Guidelines for Indications of Elective Ascending Thoracic Aortic Aneurysm Surgery?

Elaine Tseng, MD
Professor of Surgery, University of California San Francisco

Houston Aortic Symposium, March 3, 2026

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Disclosures

- No disclosures.

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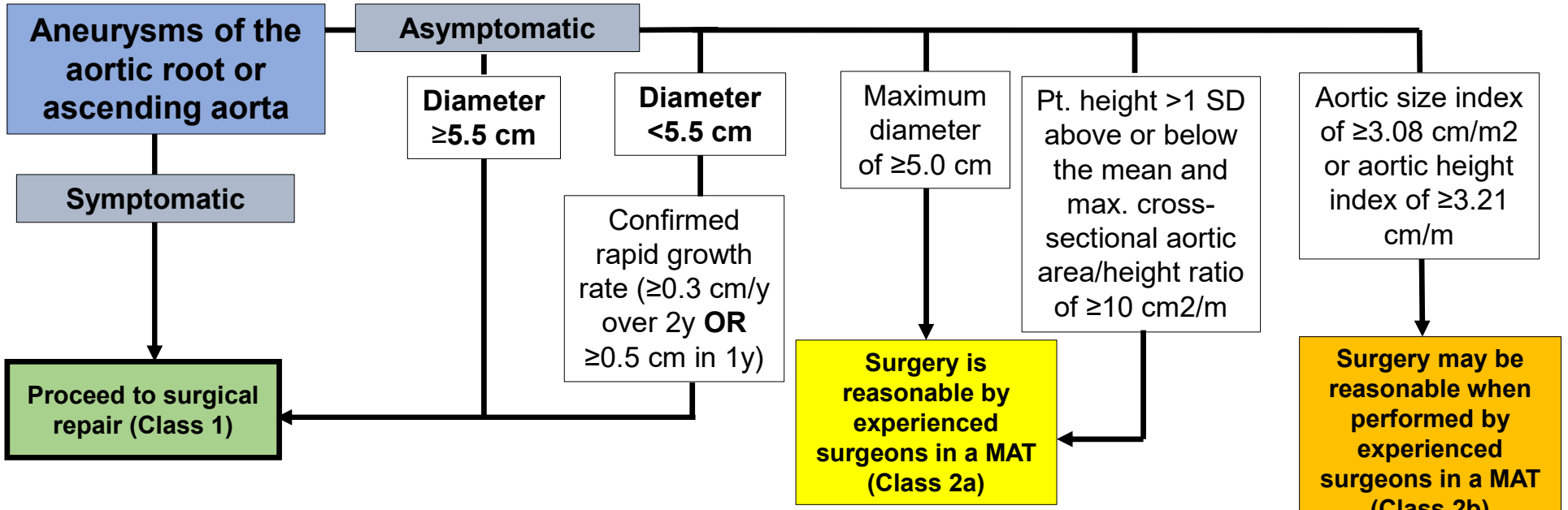
ACC/AHA CLINICAL PRACTICE GUIDELINE

2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines

Writing Committee Members*

Eric M. Isselbacher, MD, MSc, FACC, Chair; Ourania Preventza, MD, MBA, Vice Chair; James Hamilton Black III, MD, DFSVS, Vice Chair; John G. Augoustides, MD, FAHA†; Adam W. Beck, MD, DFSVS; Michael A. Bolen, MD‡; Alan C. Braverman, MD, FACC; Bruce E. Bray, MD, FACC§; Maya M. Brown-Zimmerman, MPH||; Edward P. Chen, MD, FAHA; Tyrone J. Collins, MD, MSCAI, FACC, FAHA, FSVM¶; Abe DeAnda Jr, MD, FAHA; Christina L. Fanola, MD, MSc; Leonard N. Girardi, MD, FAHA#; Caitlin W. Hicks, MD, MS, FSVS**; Dawn S. Hui, MD; William Schuyler Jones, MD, FACC††; Vidyasagar Kalahasti, MD, FACC; Karen M. Kim, MD, MS‡‡; Dianna M. Milewicz, MD, PhD; Gustavo S. Oderich, MD; Laura Ogbechie, MSN; Susan B. Promes, MD, MBA; Elsie Gyang Ross, MD, MSc; Marc L. Schermerhorn, MD, DFSVS§§; Sabrina Singleton Times, DHSc, MPH||||; Elaine E. Tseng, MD, FAHA; Grace J. Wang, MD, MSCE; Y. Joseph Woo, MD, FACC, FAHA††

AHA/ACC Guidelines: Surgery for Sporadic Aneurysms of Aortic Root & Ascending Aorta



Pt. undergoing repair or replacement of tricuspid AV with a concomitant aneurysm of the ascending aorta with max. diameter of ≥4.5 cm → **Ascending aortic replacement is reasonable by experienced surgeons in MAT (Class 2a)**

Pt. undergoing cardiac surgery for other than AV repair or replacement with aneurysm of the aortic root or ascending aorta and max. diameter of ≥5.0 cm → **Ascending aortic replacement may be reasonable (Class 2b)**

AV indicates aortic valve; cm, centimeter; CT, computed tomography; yr, year; MAT, multidisciplinary aortic team; max, maximal; pt, patient; SD, standard deviation; and y, year.

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Isselbacher, E. M., et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease. *Circulation*.

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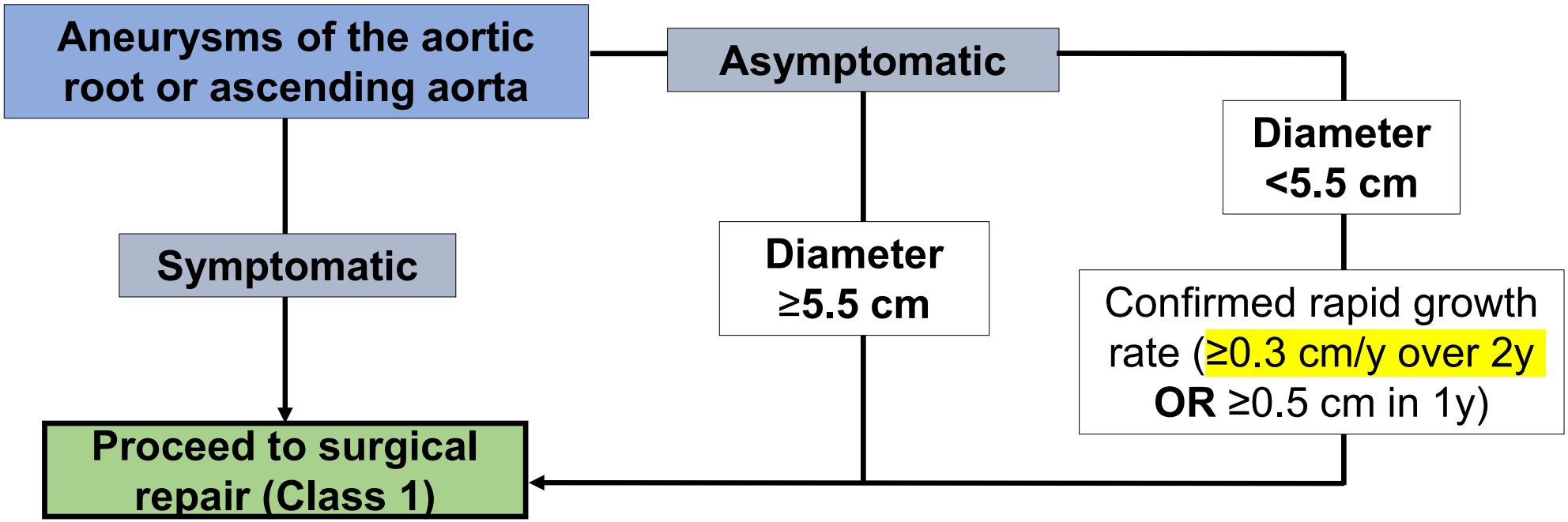

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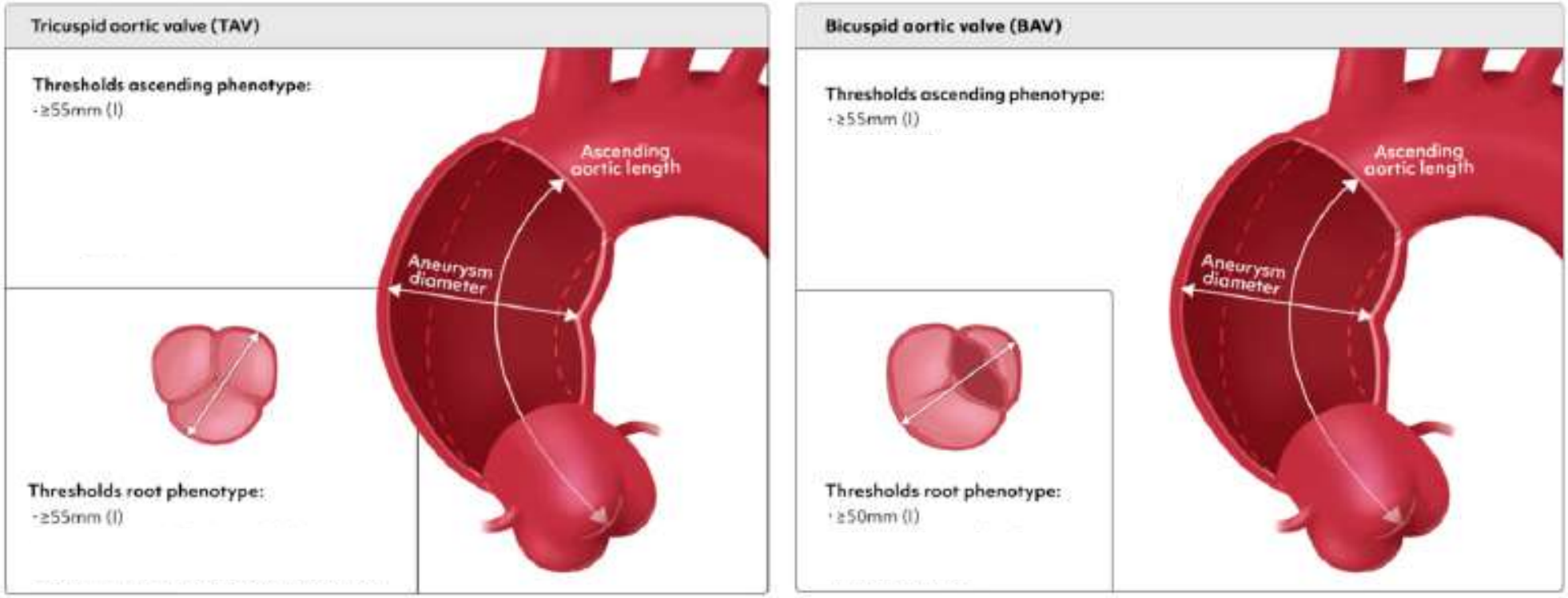
EACTS/STS Guidelines: Surgery for Root and Ascending Aortic Sporadic Aneurysms

Thresholds for Intervention in Aortic Root and Ascending Aortic Aneurysm



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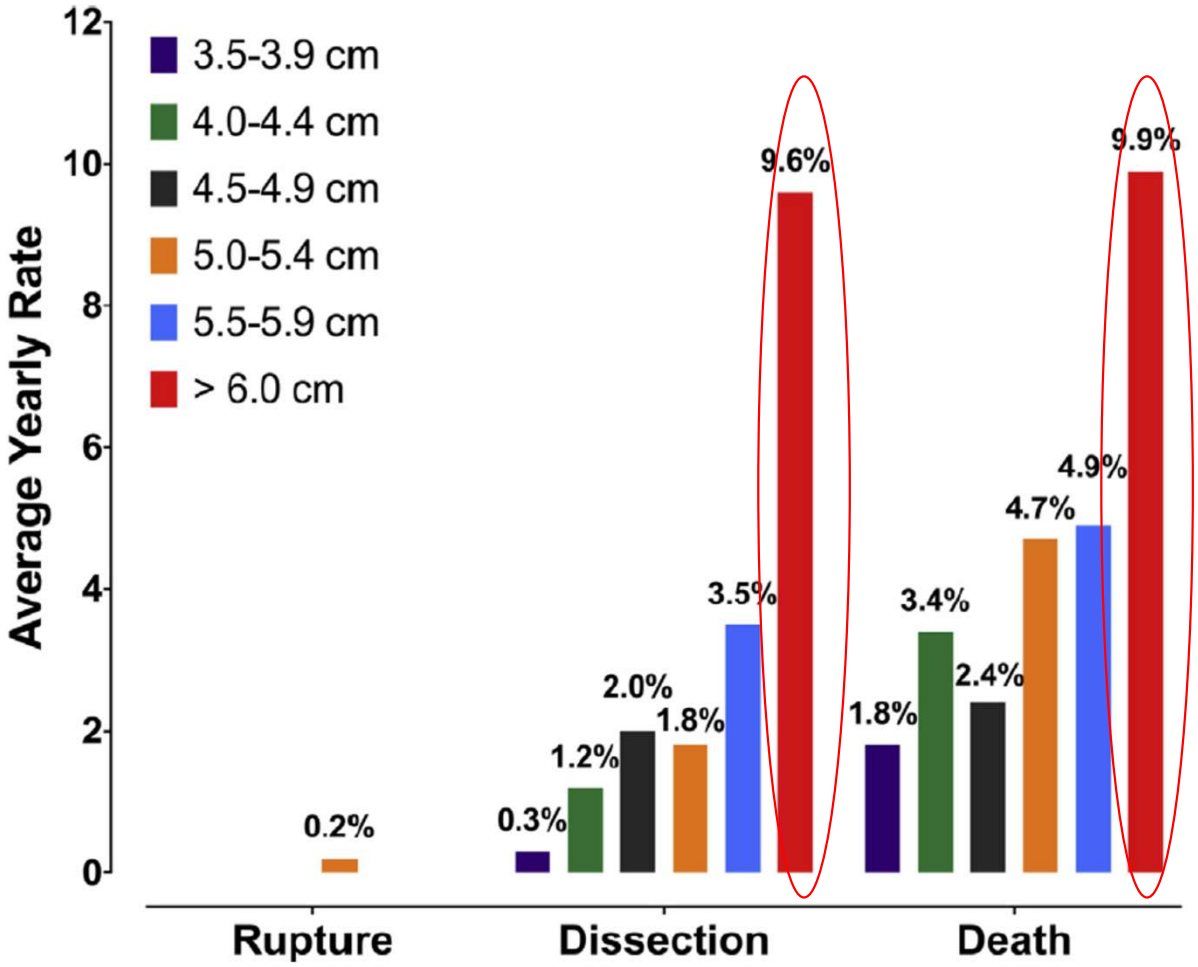
Czerny. EACTS/STS Guidelines for diagnosing and treating acute and chronic syndromes of the aortic organ. EJCTS 2024;65(2)ezad426

Guideline Data: Yale Natural History Study



- 3349 TAA pts total
- 780 aTAA pts
- Radiology 1272 size measurements
- Mean f/u 48mo
- Marfan 4%, Fam Hx 22%
- 5.5-5.9cm 3.5% dissection, and 6.8% rupture, AD, death

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Zafar JTCVS 2018;155:1938-50

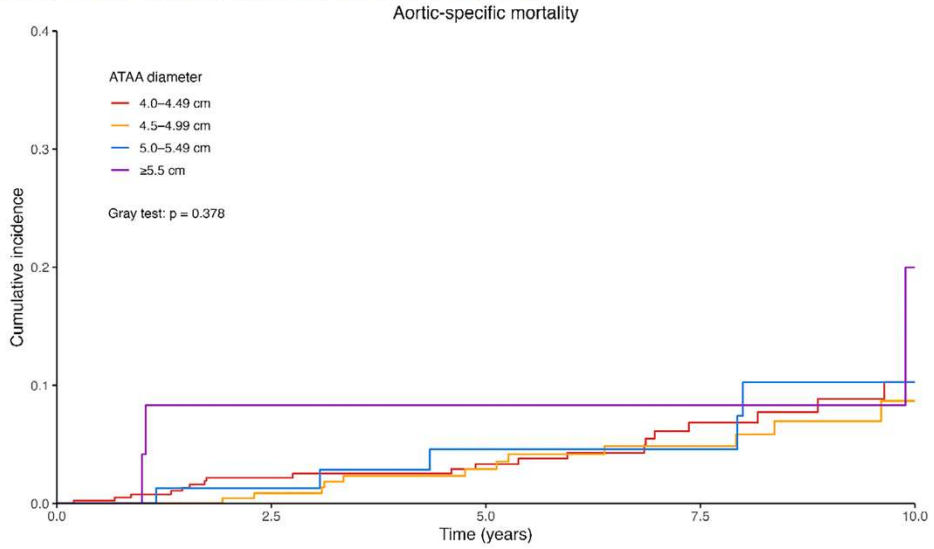
Validation: ATAA in VA Health System

Journal of the American Heart Association

ORIGINAL RESEARCH

Ascending Thoracic Aortic Aneurysms in a Veterans Affairs Health System: Longitudinal Outcomes and Risk Factors

Axel Gomez, MD; William Carroway, MD; Sally Tu, BS; Vidur Kailash, BA; Liang Ge, PhD; Marko Boskovski, MD, MHS, MPH; Elaine E. Tseng, MD



- ≥4.0cm 1998-2024
- N=764, 98% men
- Age 75 (9.3)
- BAV 7.9%
- No HTAD
- F/U 5.4 (6.2) yrs

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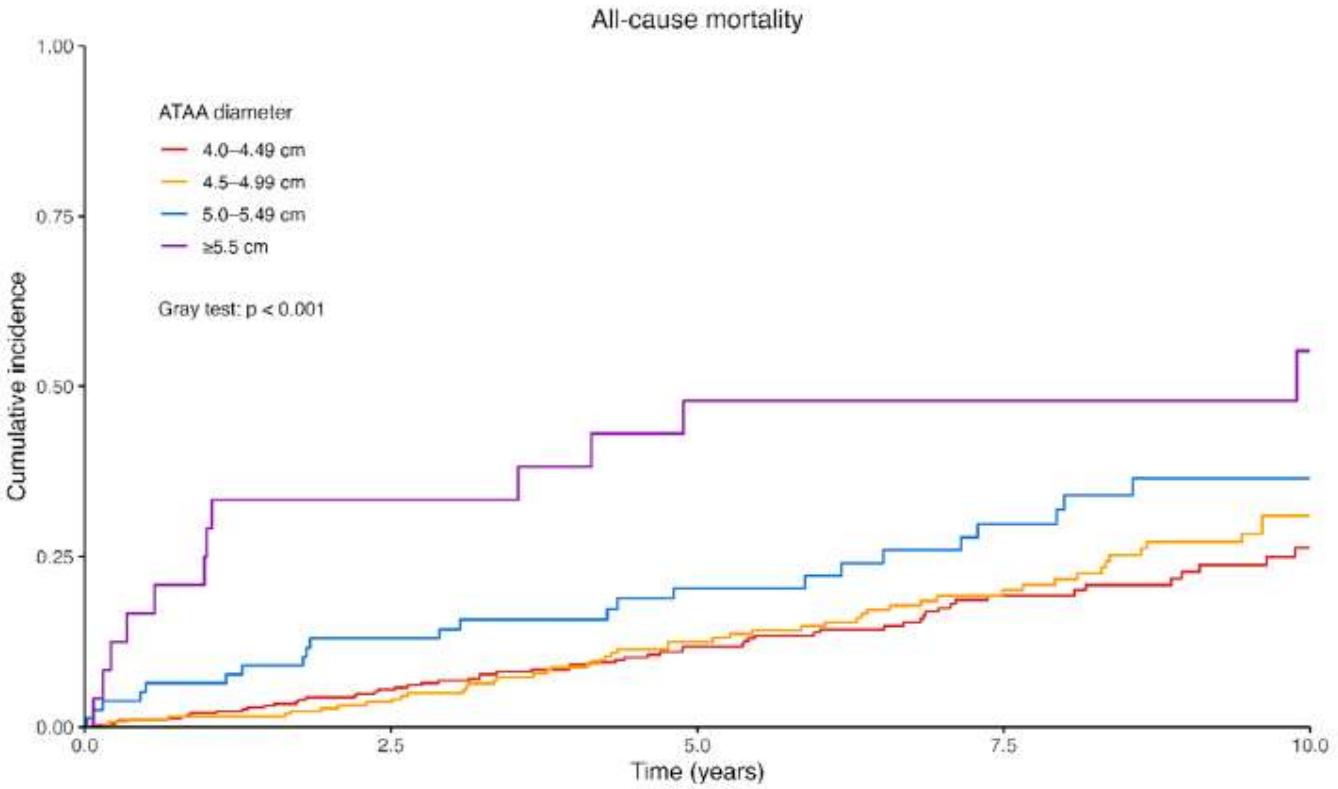
Tseng et al JAHA 2026;15:e044959

Validation: ATAA in VA Health System



- All cause mortality significant increase at ≥ 5.5cm

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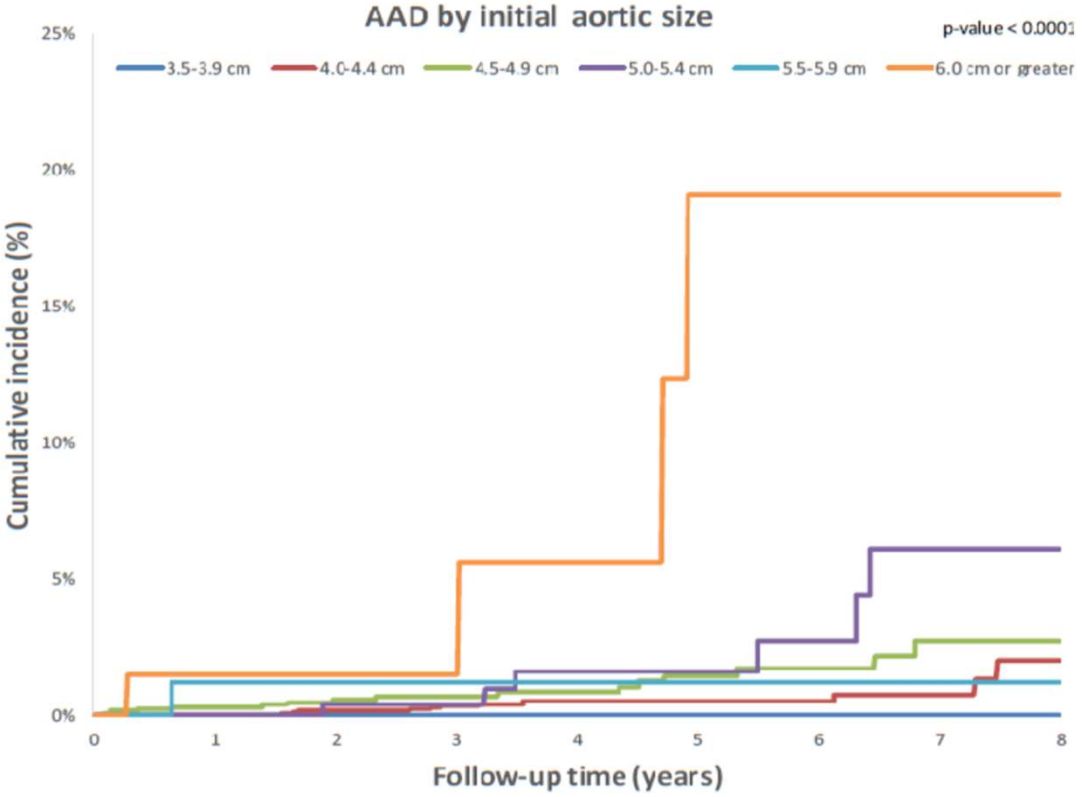
Tseng et al JAHA 2026;15:e044959

Validation: Kaiser Permanente-TAA Study



Patients at risk

3.5-3.9 cm	726	630	503	400	304	219	155	76	43
4.0-4.4 cm	3120	2604	1954	1416	990	681	454	222	96
4.5-4.9 cm	1698	1312	996	782	566	400	285	164	95
5.0-5.4 cm	548	323	239	186	136	104	70	40	26
5.5-5.9 cm	156	76	54	40	31	25	22	12	7
6.0 cm or greater	124	45	33	24	16	12	8	4	1

Solomon JAMA Card 2022;7(11):1160-9

- N=6372 2000-2016
- 32% women
- ≥ 3.5cm
- F/U 3.7 yrs
- BAV 11%, no HTAD
- Age 68.6 (13)
- Age at AD 75 (64-81) yrs
- No AD <4.0cm
- Hinge point 6cm for AD and AD + all-cause mortality

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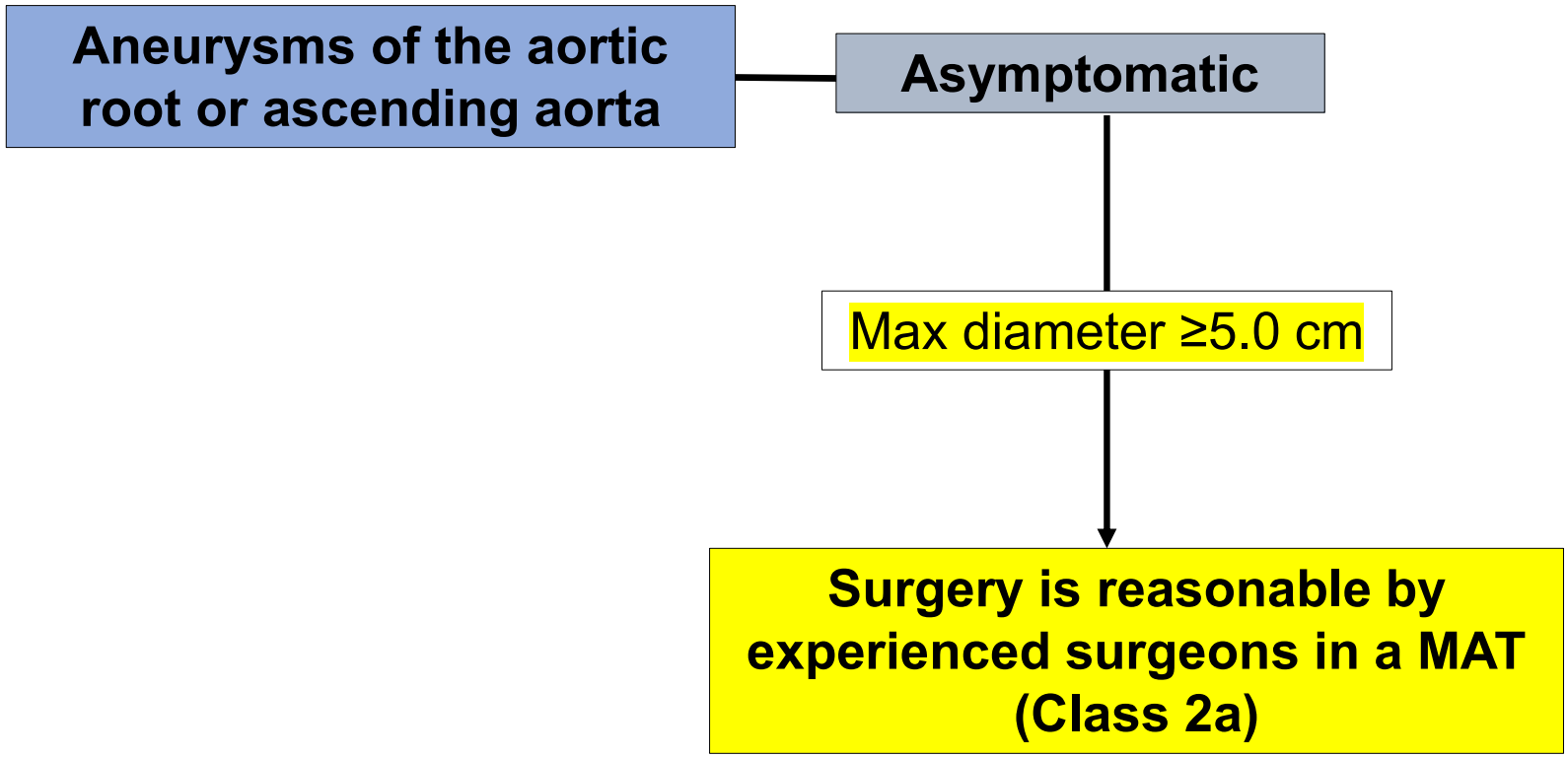
AHA/ACC Guidelines: Surgery for Sporadic Aneurysms of Aortic Root and Ascending Aorta



MAT, multidisciplinary aortic team; max, maximal; pt, patient; SD, standard deviation;

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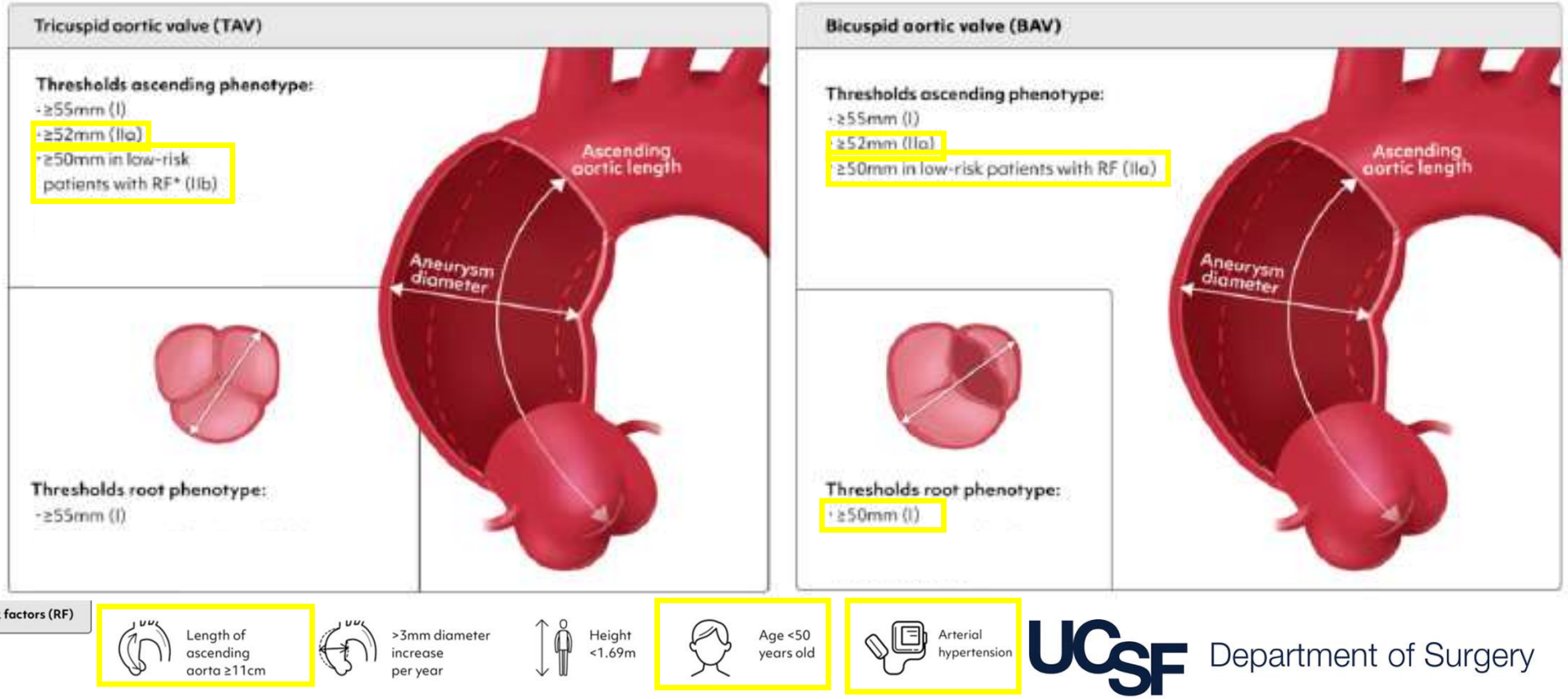

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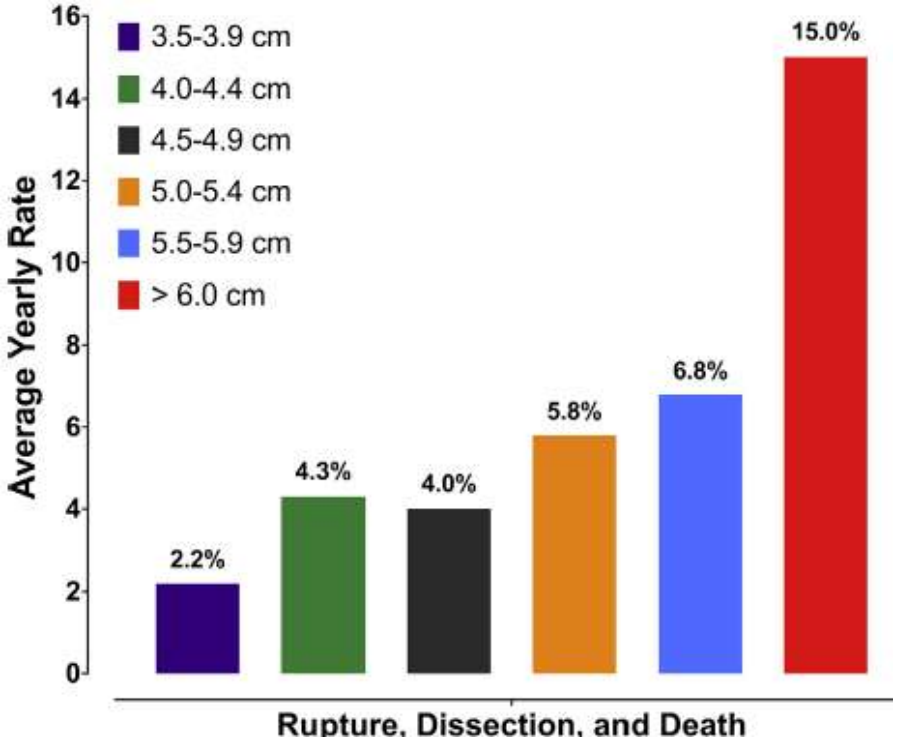
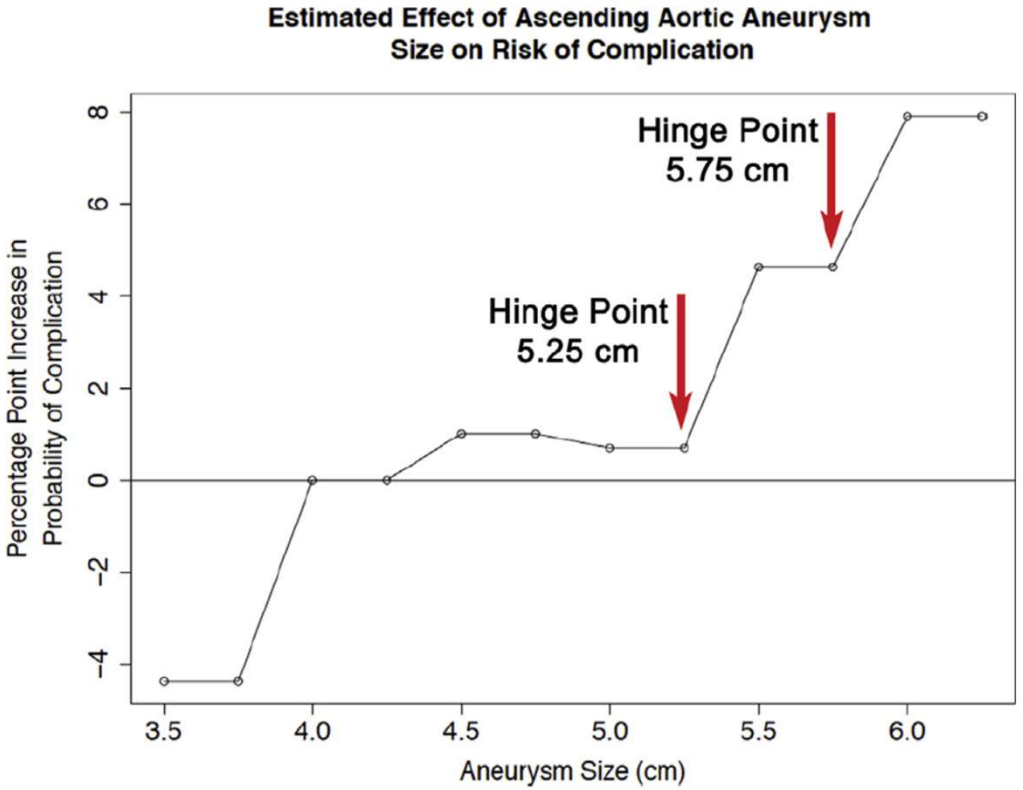
Czerny. EACTS/STS Guidelines for diagnosing and treating acute and chronic syndromes of the aortic organ. EJCTS 2024;65(2)ezad426

Guideline Data: 52.5mm Hinge Point





- 780 aTAA pts (1272 size measurements), mean f/u 48mo
- First hinge point 5.25cm, second 5.75cm
- Includes HTAD and family hx

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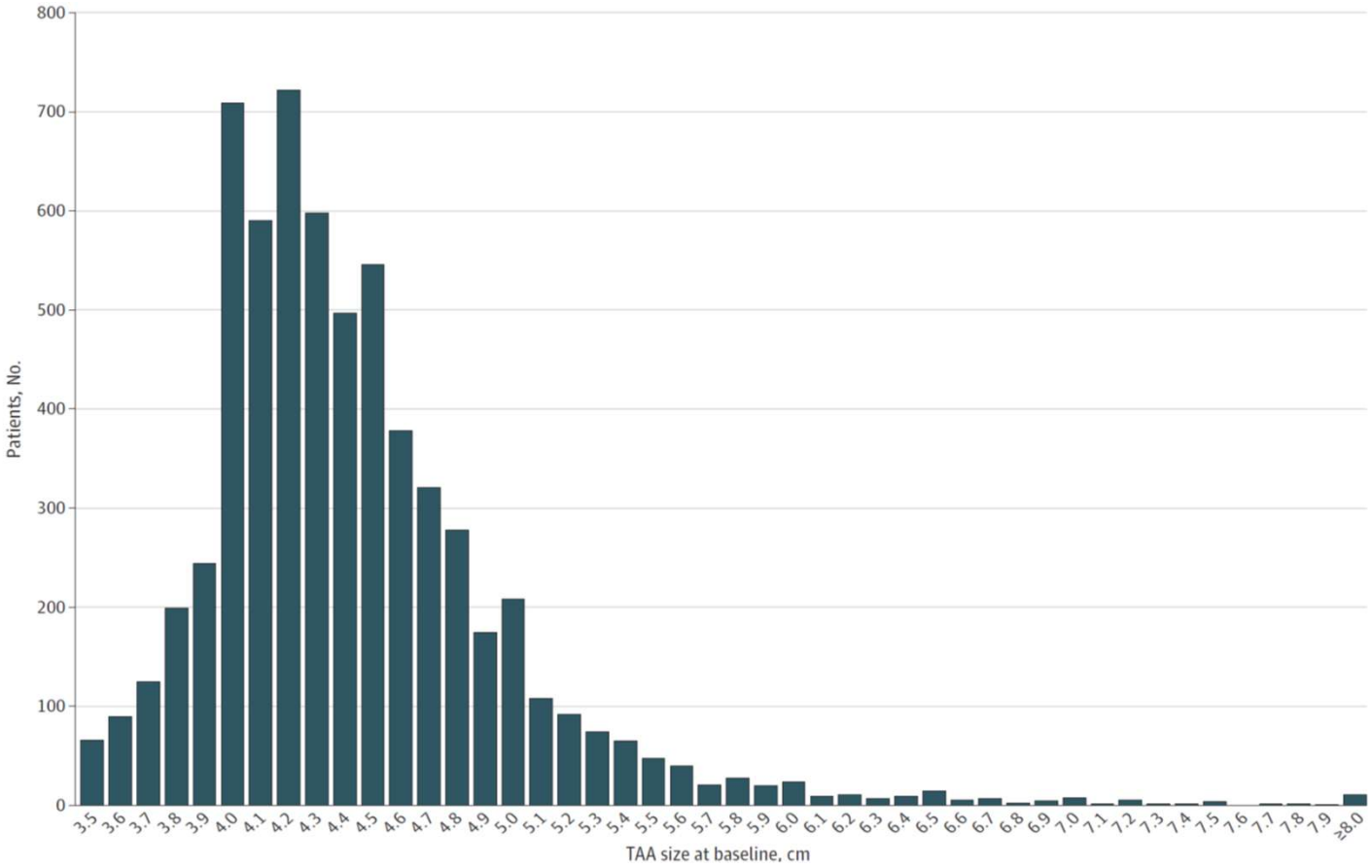
Zafar JTCVS 2018;155:1938-50

Kaiser-Permanente-TAA Study



- 6372 aTAA pts from 2000-2016
- TAA ≥3.5cm, >18 yrs, no aortic surgery or dissection, no genetic aortic disease
- 32% women
- Mean age 68.6 (13)
- Mean TAA size at dx: 4.3cm
- Mean f/u 3.7 yrs
- BAV 11%

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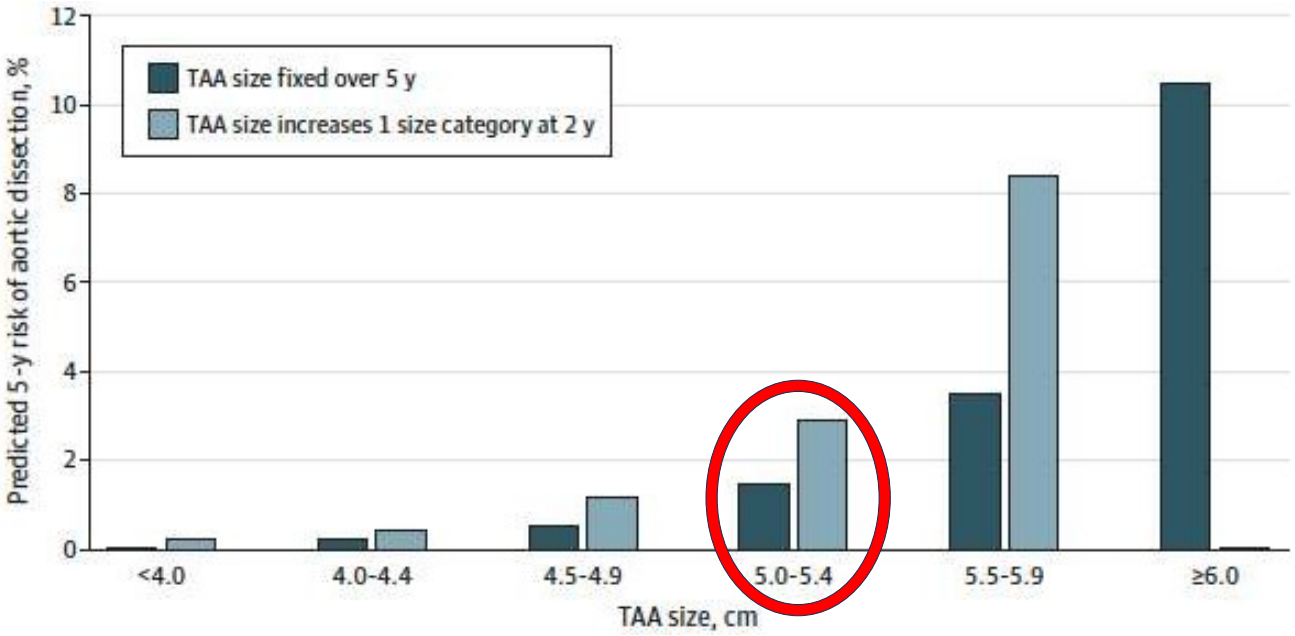
Solomon JAMA Card 2022;7(11):1160-9

5-Year Predicted Risk of Dissection from Size & Growth



Predicted risk AD in 5yrs:

- 4-4.4cm 0.3% (CI 0.3-0.7)
- 4.5-4.9cm 0.6% (0.4-1.3)
- 5.0-5.4cm 1.5% (1.2-3.9)
- 5.5-5.9cm 3.6% (1.2-12.8)
- ≥6cm 10.5% (2.7-44.3)

Solomon JAMA Card 2022;7(11):1160-9

- Aortic dissection 44pts 0.7%
  - Only 1 BAV (1/747pts)
  - 27 Ascending, 13 Root, 4 Arch
  - 37 dissection, 3 IMH, 4 rupture
- Incidence 0.22/100pt-yrs
- Median age at AD 75yrs (64-81yrs)
- No AD <4.0cm
- Dissection rates:
  - >4cm <6cm <0.5/100pt-yr, <1%/yr
  - ≥6cm 2.19/100pt-yr
- Hinge point 6cm for AD and AD + all-cause mortality

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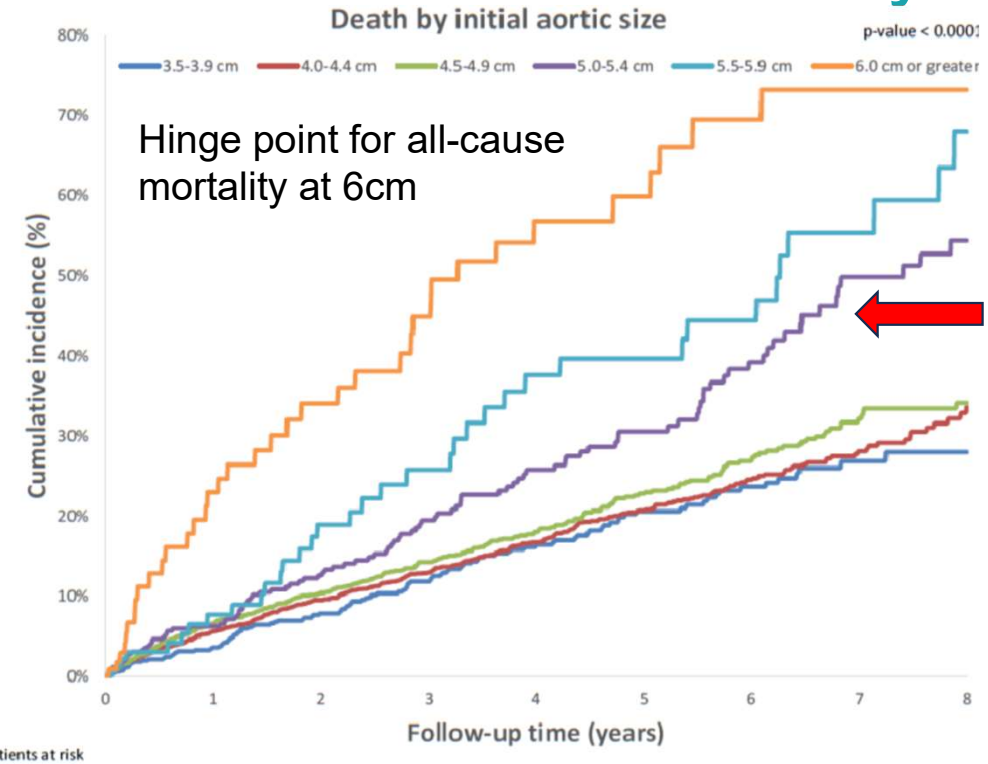
KP-TAA All-Cause Mortality and Elective Aortic Surgery



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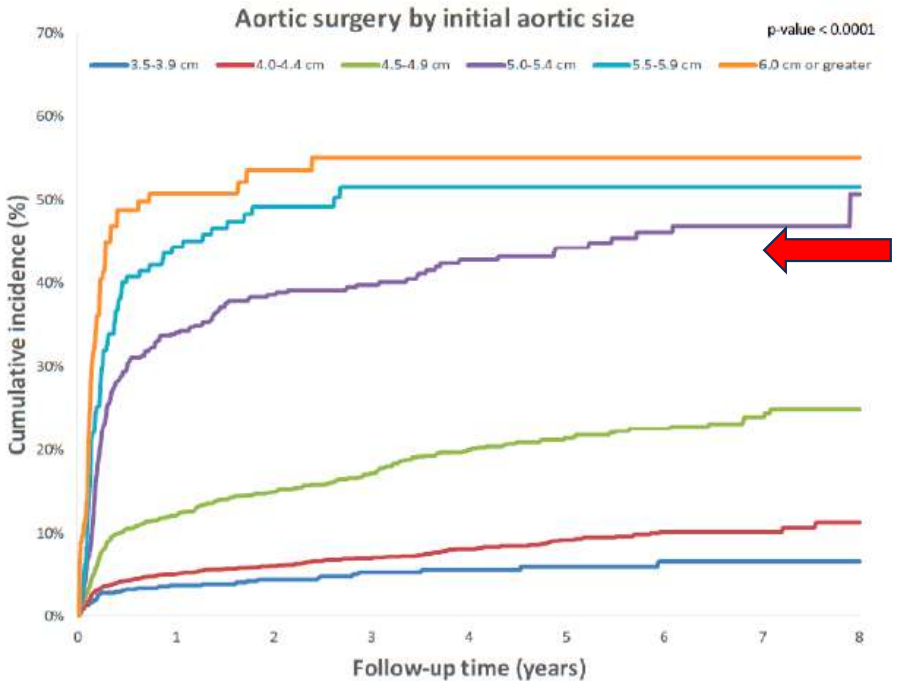
4.5-4.9 cm	1698	1314	998	767	567	401	286	165	96
5.0-5.4 cm	548	323	239	186	136	104	70	40	26
5.5-5.9 cm	156	76	54	40	31	25	22	12	7
6.0 cm or greater	124	45	33	24	16	13	9	5	2



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6.0 cm or greater	124	45	33	24	16	12	8	4	1

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Unadjusted Outcomes

Table 2. Unadjusted Outcomes of Death, Aortic Dissection, and Aortic Surgery by Initial Thoracic Aortic Aneurysm (TAA) Size and Time-Updated TAA Size

	No. (%)	Total event-free person-years, No.	Deaths, No. (%)	Aortic dissection or rupture, No. (%)	Aortic surgical procedures, No. (%)	Rate of aortic dissection per 100 person-years (95% CI)[b]	Rate of aortic dissection or all-cause death per 100 person-years (95% CI)[b]
Outcomes by initial TAA size, cm							
<4.0	726 (11.4)	2700	121 (16.7)	0	38 (5.2)	0.00 (0.00-0.00)	4.41 (3.68-5.28)
4.0-4.4	3120 (49.0)	10 005	514 (16.5)	15 (0.5)	237 (7.6)	0.15 (0.09-0.25)	4.96 (4.54-5.42)
4.5-4.9	1698 (26.7)	5436	324 (19.1)	18 (1.1)	313 (18.4)	0.33 (0.21-0.53)	5.63 (5.04-6.30)
5.0-5.4	548 (8.6)	1380	136 (24.6)	6 (1.1)	225 (41.1)	0.43 (0.20-0.97)	8.48 (7.07-10.16)
5.5-5.9	156 (2.5)	334	40 (25.6)	1 (0.6)	78 (50.0)	0.30 (0.04-2.12)	11.06 (8.01-15.27)
≥6.0	124 (2.0)	182	47 (37.9)	4 (3.2)	64 (51.6)	2.19 (0.82-5.84)	21.36 (15.61-29.24)
Outcomes by time-updated TAA size, cm[a]							
<4.0	NA	3039	146	0	40	0.00 (0.00-0.00)	4.48 (3.78-5.30)
4.0-4.4	NA	9808	486	11	209	0.11 (0.06-0.20)	4.79 (4.38-5.25)
4.5-4.9	NA	5169	311	13	281	0.25 (0.15-0.43)	5.77 (5.15-6.46)
5.0-5.4	NA	1479	130	8	249	0.54 (0.27-1.08)	7.78 (6.48-9.34)
5.5-5.9	NA	348	47	4	97	1.15 (0.43-3.06)	12.62 (9.39-16.96)
≥6.0	NA	194	62	8	79	4.11 (2.05-8.21)	27.21 (20.79-35.62)

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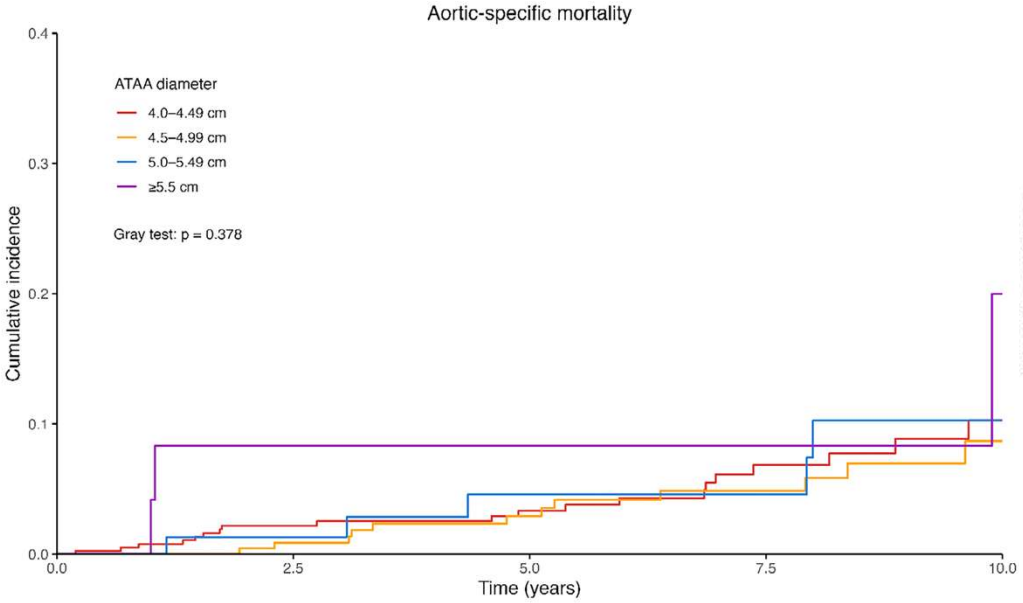
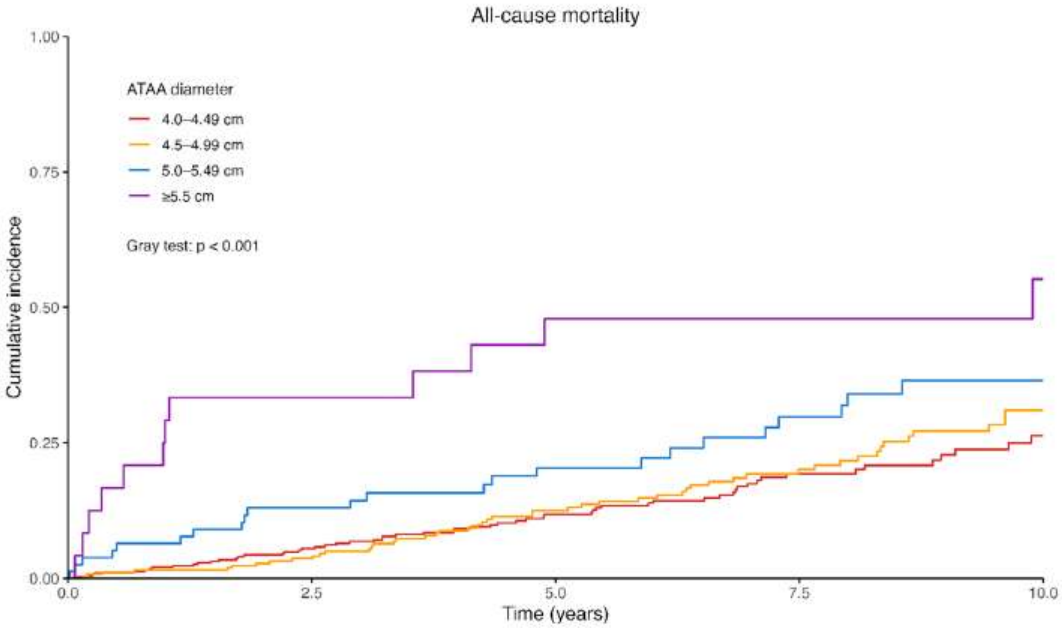
SFVA ATAA Aortic and All-Cause Mortality

VA Health System





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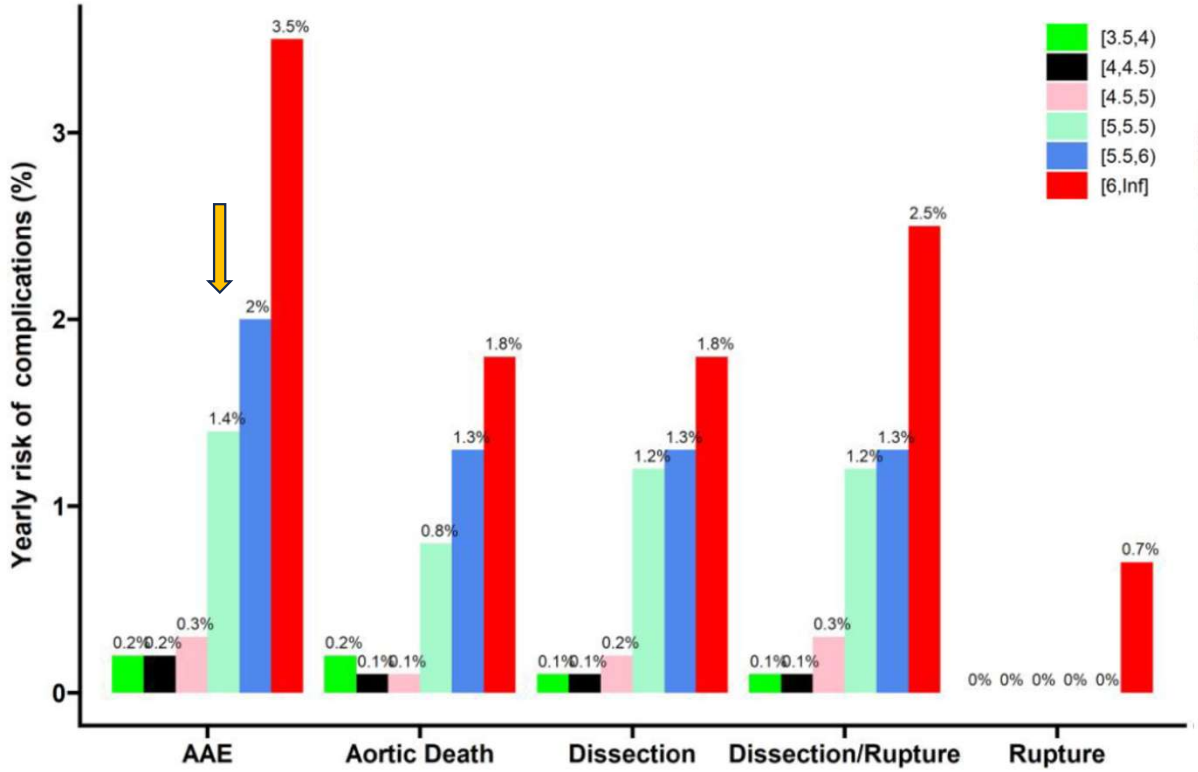
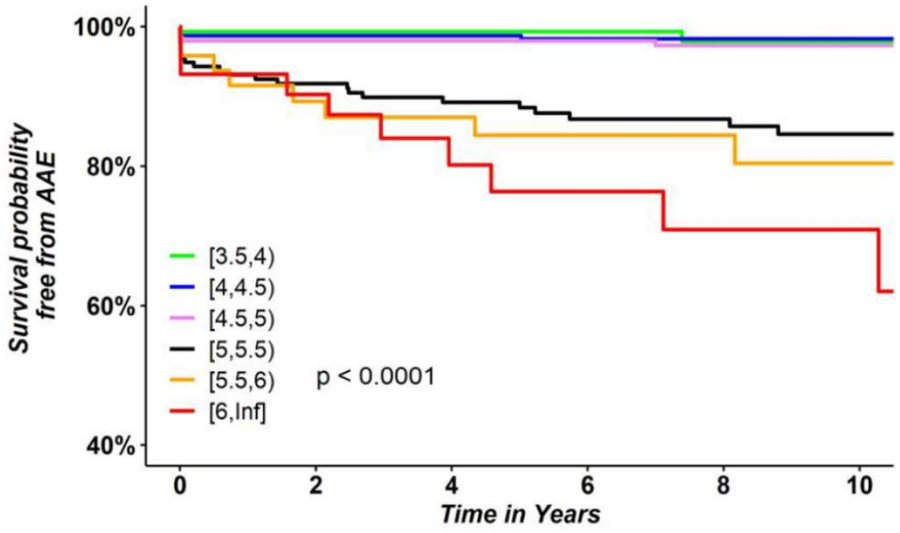
Tseng et al JAHA 2026;15:e044959

Yale Adverse Aortic Event Rates: 3 Decades





Number at risk

[3.5,4)	141	118	105	83	60	48
[4,4.5)	307	275	247	193	157	117
[4.5,5)	247	229	200	164	128	105
[5,5.5)	177	142	126	100	86	65
[5.5,6)	48	39	35	27	21	13
[6,Inf]	44	31	21	15	10	8

- 964 unoperated aTAA pts, median f/u 7.9 yrs
- 54 (5.7%) AAE

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Wu EJCTS 2023;44:4579-88

Surgery for Sporadic Aneurysms of Aortic Root and Ascending Aorta

AHA Guidelines Key Take-Away

The **goal** of prophylactic repair of aneurysms of the aortic root and ascending aorta is **to prevent life threatening complications** from acute aortic events such as aortic dissection, rupture, or sudden death.

This goal is best achieved when the **risk** of future adverse aortic events is **greater than** the **expected surgical mortality** (considering both the surgeon's and institutional experience).

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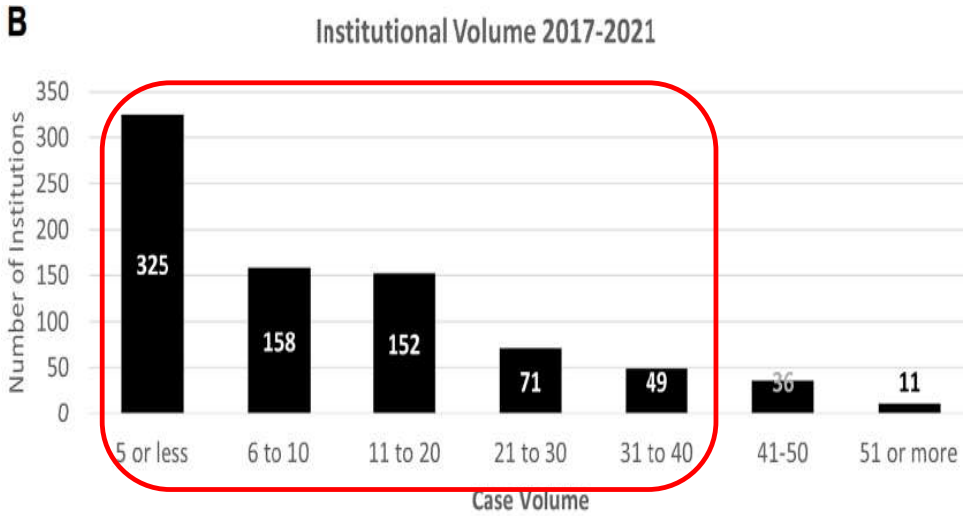
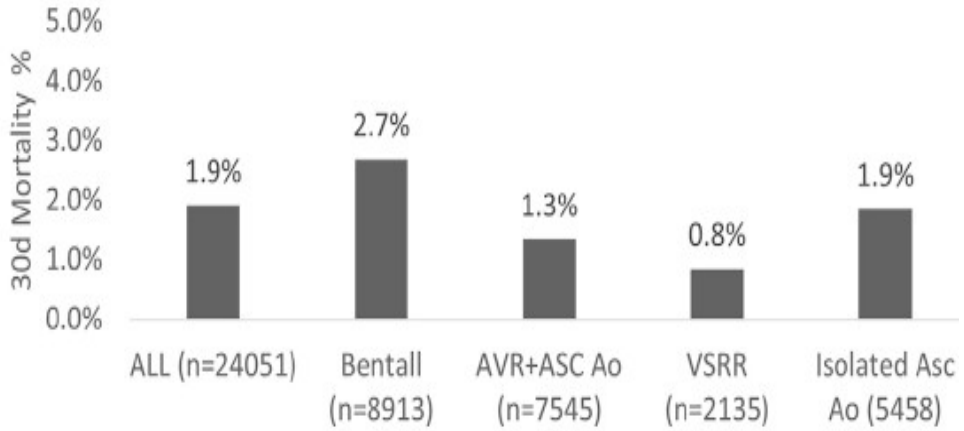
STS Aortic Surgery Mortality Risk Model





- 24051 nonemergent pts over 4 years at 905 hospitals, HCA 30.4%
- Only 47 hospitals did >10 cases per year
- 11 hospitals did ~12000 cases over 4 years, ~270 cases/yr each
- Overall aortic surgery mortality was 1.9%
- No volume-outcome relationship listed

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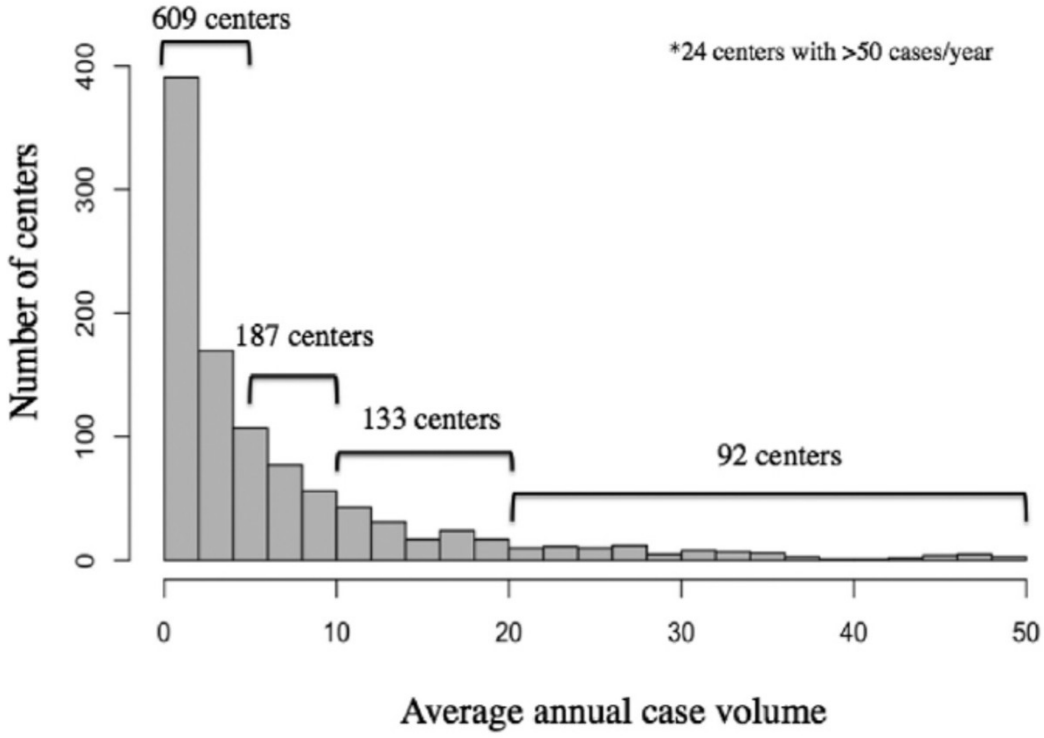
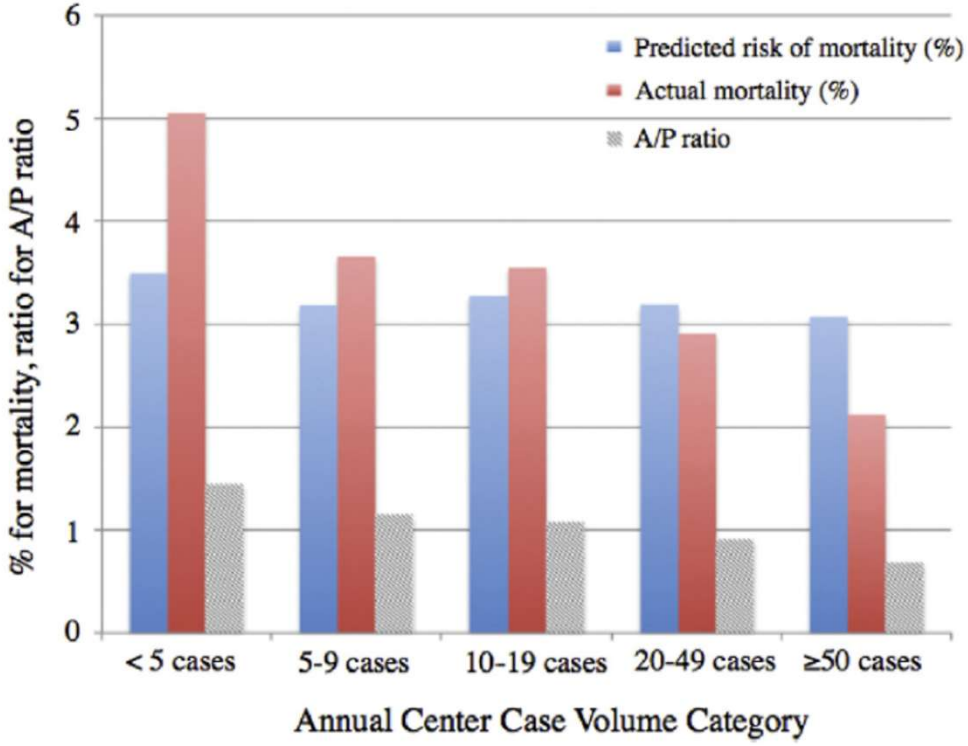
Desai Ann Thorac Surg 2025;119:109-19

STS: Data on Ascending Aneurysm Volume per Center to Outcome Relationship





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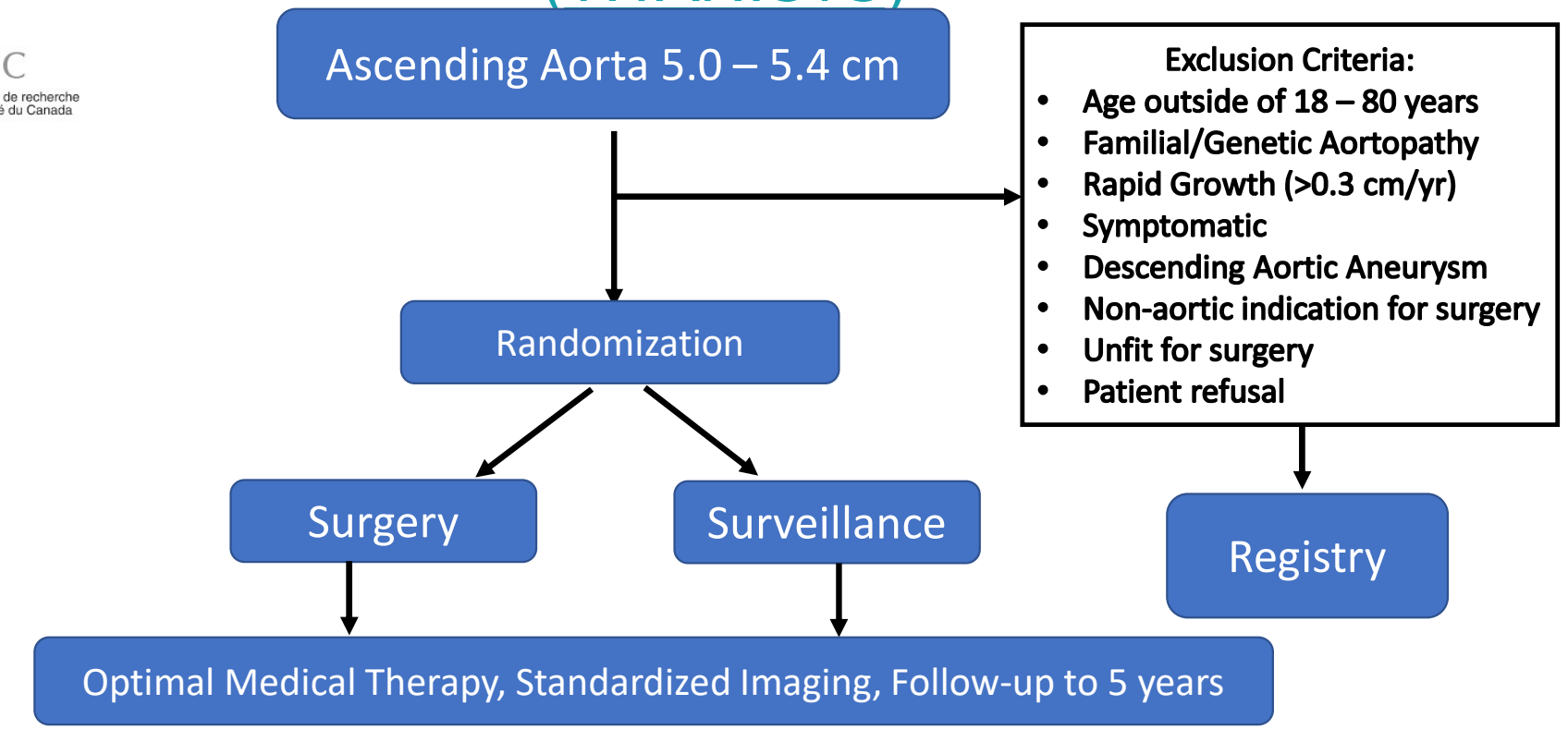
- Mori et al. ATS 2018;106:1095-104

Treatment In Thoracic Aortic aNeurysm: Surgery vs. Surveillance (TITAN:SvS)

CIHR IRSC
Canadian Institutes of Health Research | Instituts de recherche en santé du Canada



Primary Outcome: All cause mortality

Secondary Outcomes: Acute Aortic Syndrome, 30-day mortality, incidence of elective aortic surgery, stroke, aortic growth, QOL

Imaging Core Lab

BioBank (Blood + Tissue)

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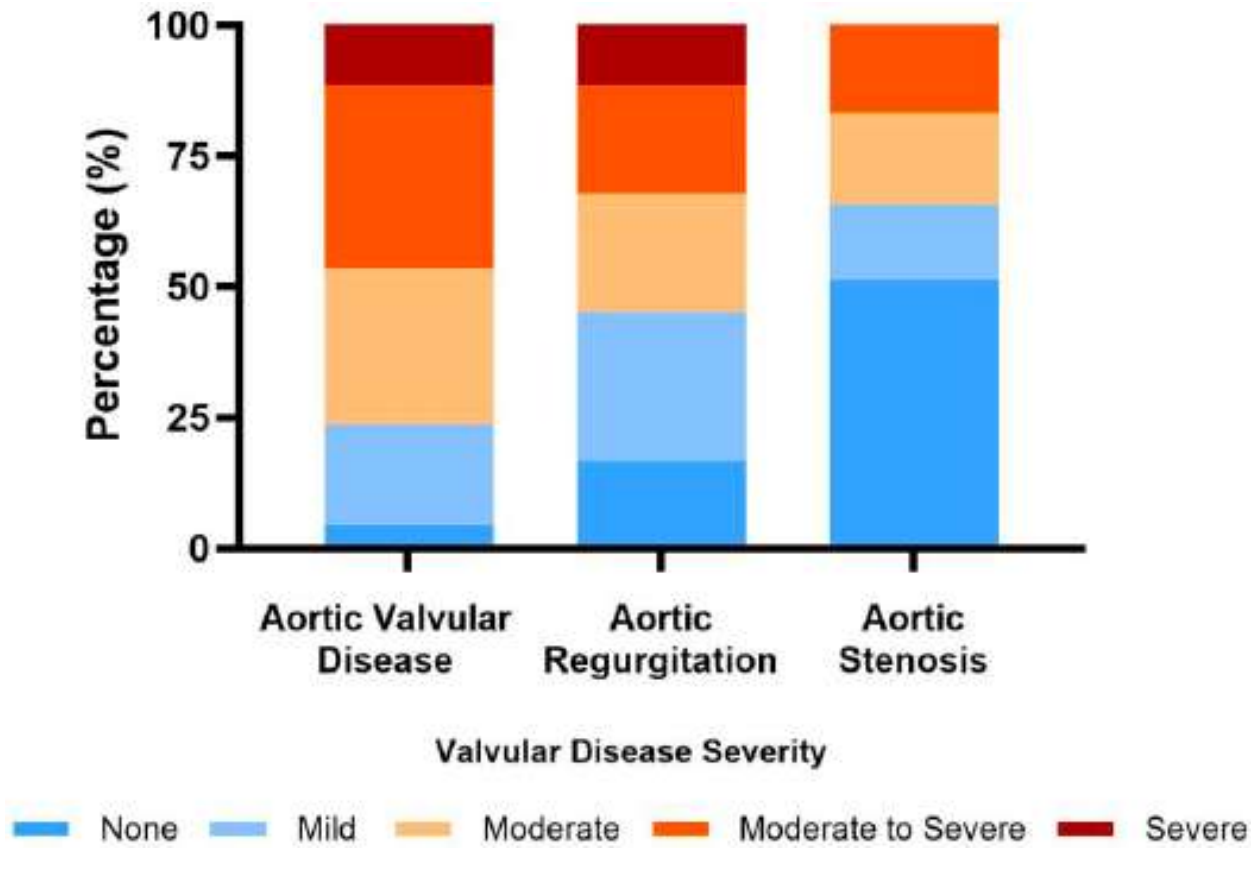
Clinical Trials.gov NCT03536312

TITAN:SvS

Unintended Impact of Left Shift

- TITAN 2021-2025



- 369 pts surgery
- Mean age 62 (11.7)
- Women 22%
- Size 50.2 (2.9) mm
  - 20% root phenotype
- SAVR 35.5% N=131
  - 11.5% severe AV dz
  - 24% no/mild AV dz
- Root replacement N=174
  - 33% SAVR
    - 90% not severe
    - 27% no/mild dz

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Guo MH, et al. ATS 2026 submitted

Unintended Impact of Left Shift

- Multivariate analysis for predictors of need for aortic valve replacement

Variable	Multivariable	p
≥ Mild Pre-operative Aortic Regurgitation	2.8 (1.7 – 4.7)	<0.01
≥ Mild Pre-operative Aortic Stenosis	34.2 (10.0 – 117.0)	<0.01
Bicuspid Aortic Valve	2.4 (1.4 – 4.1)	<0.01

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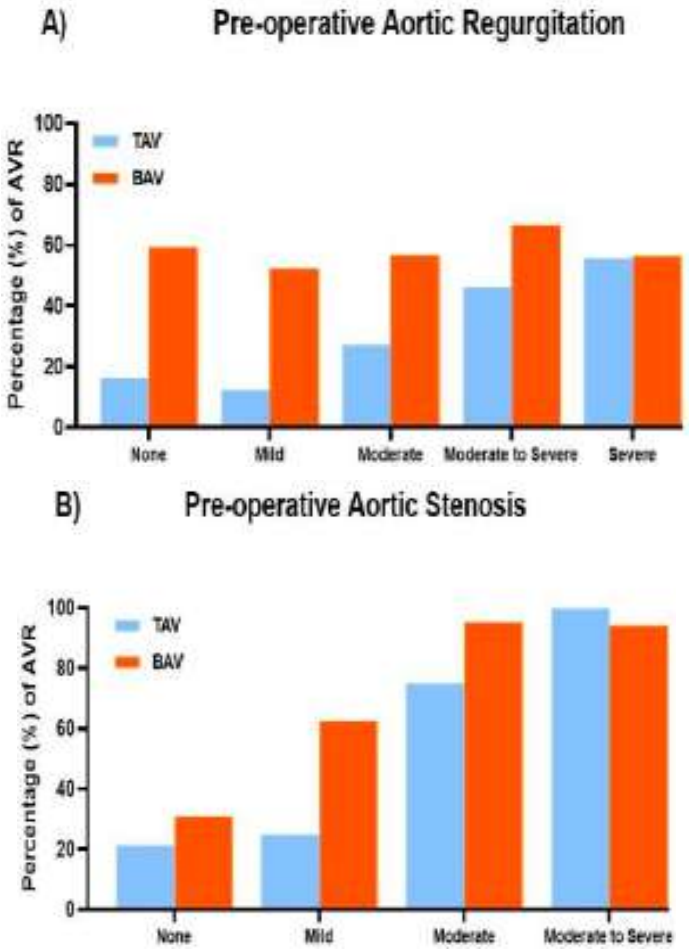
Guo MH, et al. ATS 2026 submitted

Unintended Impact of Left Shift

TITAN 2021-2025



- 5-5.4cm ATAA pts undergoing surgery: 35% had SAVR where 25% had no/mild AV dz.

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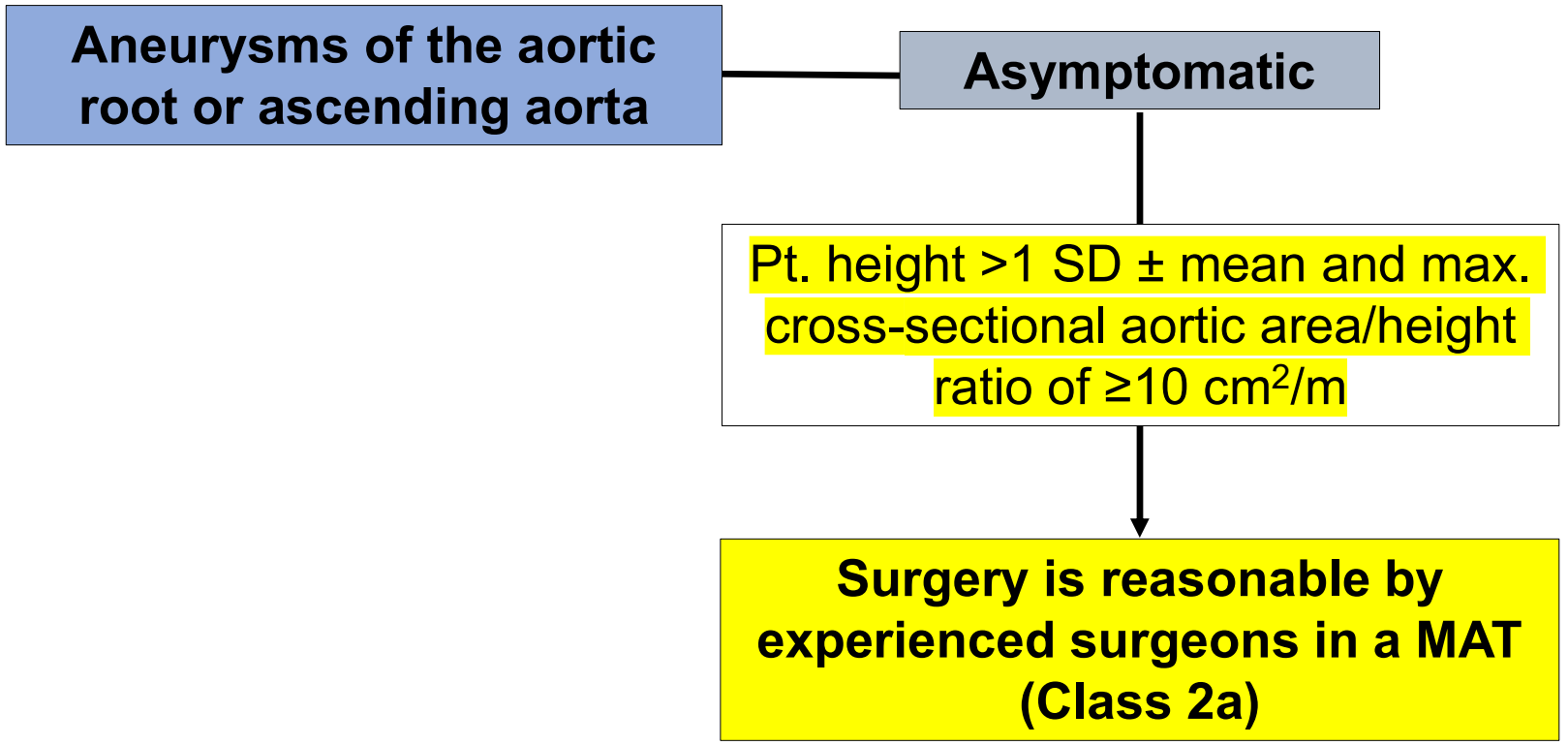

MAT, multidisciplinary aortic team; max, maximal; pt, patient; SD, standard deviation;

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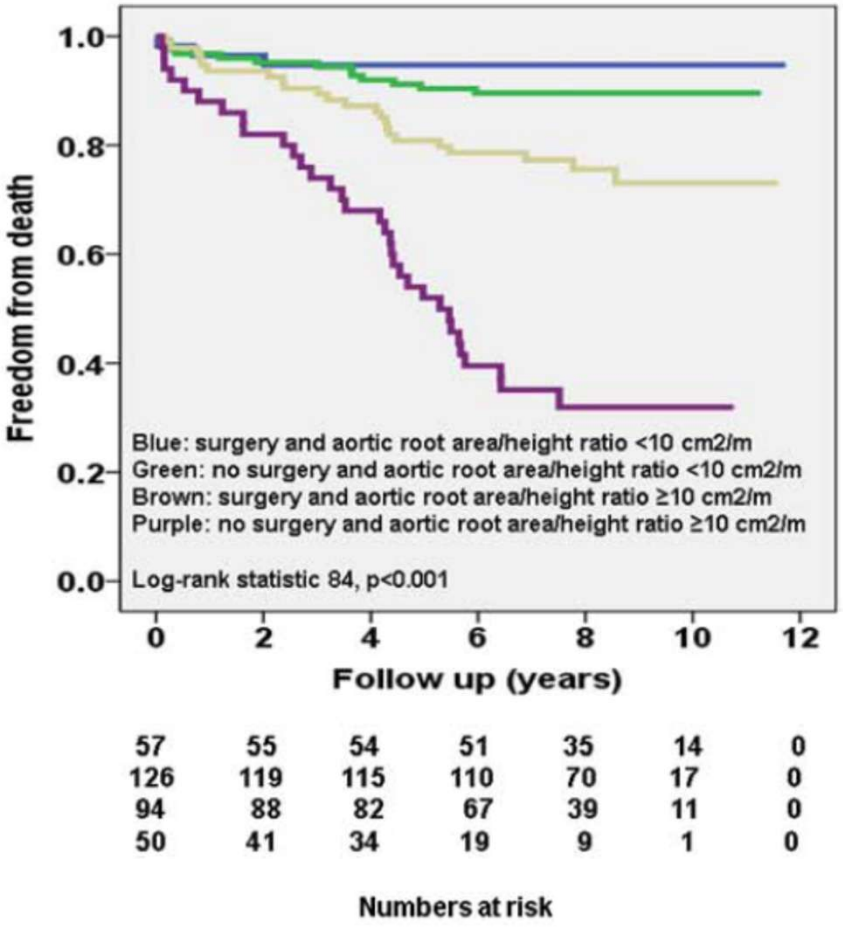
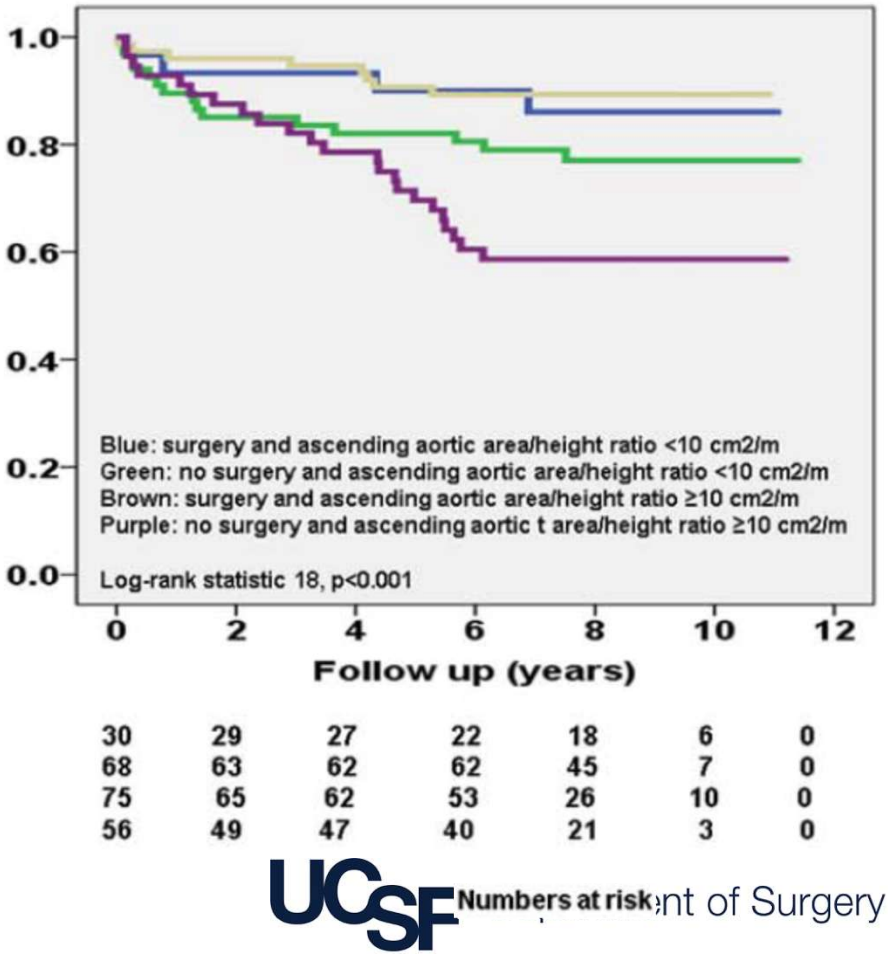
Isselbacher, E. M., et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease. *Circulation*.

Area/height ratio of ≥10 cm^2/m and All Cause Death

- **Kaplan-Meier survival curves of aortic root and ascending aorta 4.5-5.5 cm**





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- Masri et al. Circulation 2016;134:1724-37

Validation: SFVA Area/Ht and Mortality

Multivariate Analyses

Aortic-related death	P	Odds Ratio	95% conf. interval
A:H	0.004	1.21	1.07- 1.39
age	0.002	1.08	1.03- 1.13
BMI	0.49	1.02	0.96- 1.09
smoker	0.11	2.03	0.89- 5.20
valve disease	0.42	0.73	0.33- 1.53

All-cause death	p	Odds Ratio	95% conf. interval
A:H	0.156	1.05	0.98- 1.13
age	<0.001	1.11	1.08- 1.14
BMI	0.55	0.99	0.95- 1.03
smoker	0.22	1.36	0.84- 2.24
valve disease	0.70	1.09	0.70- 1.68

- N=645, ≥4cm
- Age 75
- Area/Ht ≥ 10cm^2/m
- Aortic-mortality, OR 2.06 (1.23-3.38) p=0.005
- All-cause mortality, OR 5.57 (2.58-11.76) p<0.001

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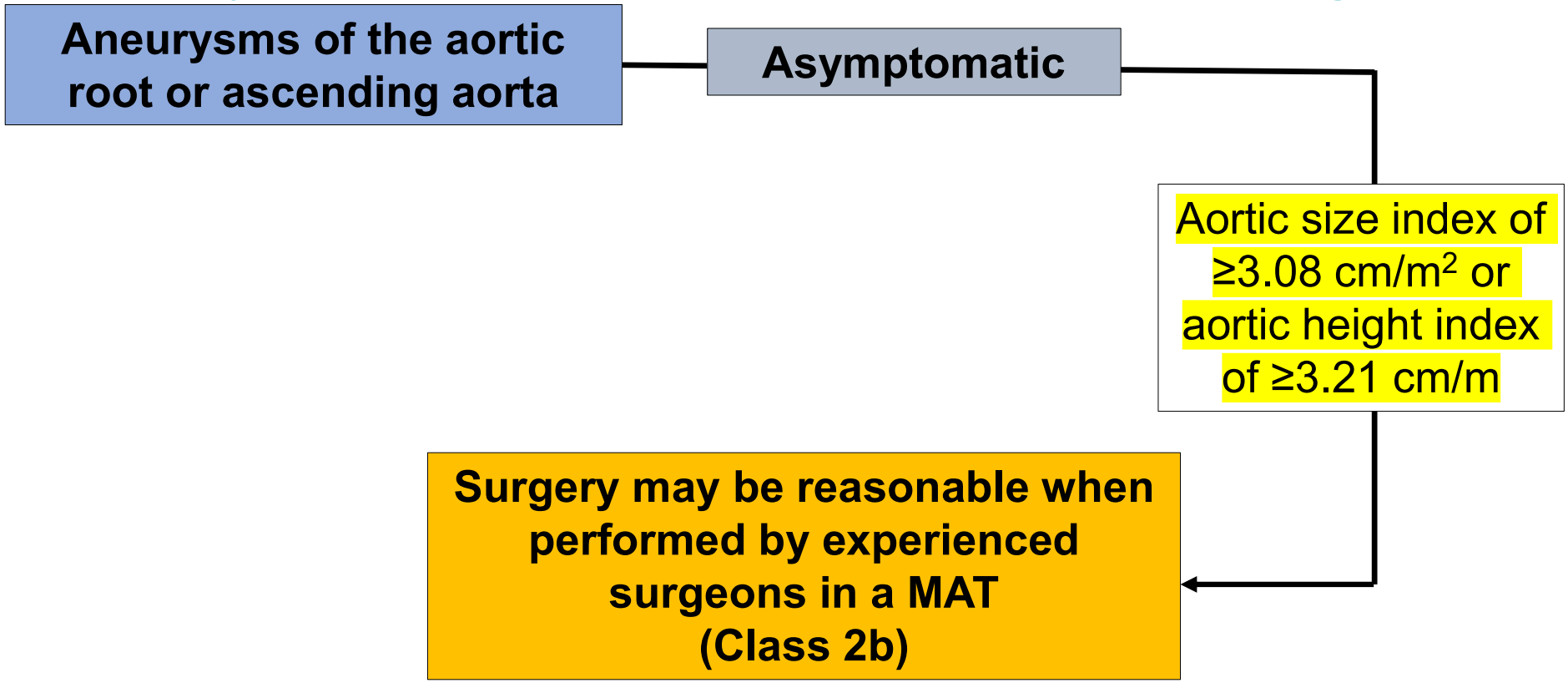
- Tseng et al. in preparation

AHA/ACC Guidelines: Surgery for Sporadic Aneurysms of Aortic Root and Ascending Aorta



MAT, multidisciplinary aortic team; max, maximal; pt, patient; SD, standard deviation; and y, year.

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Isselbacher, E. M., et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease. *Circulation*.

Aortic Size or Height Index

- **Yearly risk of rupture, dissection, and all-cause death**

	Aortic Size (cm)									
BSA (m^2)	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
1.30	2.69	3.08	3.46	3.85	4.23	4.62	5.00	5.38	5.77	6.15
1.40	2.50	2.86	3.21	3.57	3.93	4.29	4.64	5.00	5.36	5.71
1.50	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00	5.33
1.60	2.19	2.50	2.80	3.13	3.44	3.75	4.06	4.38	4.69	5.00
1.70	2.05	2.35	2.65	2.94	3.24	3.53	3.82	4.12	4.41	4.71
1.80	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17	4.44
1.90	1.84	2.11	2.37	2.63	2.89	3.16	3.42	3.68	3.95	4.22
2.00	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00
2.10	1.67	1.90	2.14	2.38	2.62	2.86	3.10	3.33	3.57	3.80
2.20	1.59	1.82	2.05	2.27	2.50	2.72	2.95	3.18	3.41	3.64
2.30	1.52	1.74	1.96	2.17	2.39	2.61	2.83	3.04	3.26	3.48
2.40	1.46	1.67	1.88	2.08	2.29	2.50	2.71	2.92	3.13	3.33
2.50	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00	3.20

= low risk (~ 4% per year) = moderate risk (~ 7% per year) = High risk (~ 12% per year) = severe risk (~ 18% per year)

		Aortic Size (cm)									
Height (inches)	(m)	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
55	*1.40*	2.50	2.86	3.21	3.57	3.93	4.29	4.64	5.00	5.36	5.71
57	*1.45*	2.41	2.76	3.10	3.45	3.79	4.14	4.48	4.83	5.17	5.52
59	*1.50*	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00	5.33
61	*1.55*	2.26	2.58	2.90	3.23	3.55	3.87	4.19	4.52	4.84	5.16
63	*1.60*	2.19	2.50	2.81	3.13	3.44	3.75	4.06	4.38	4.69	5.00
65	*1.65*	2.12	2.42	2.73	3.03	3.33	3.64	3.94	4.24	4.55	4.85
67	*1.70*	2.06	2.35	2.65	2.94	3.24	3.53	3.82	4.12	4.41	4.71
69	*1.75*	2.00	2.29	2.57	2.86	3.14	3.43	3.71	4.00	4.29	4.57
71	*1.80*	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17	4.44
73	*1.85*	1.89	2.16	2.43	2.70	2.97	3.24	3.51	3.78	4.05	4.32
75	*1.90*	1.84	2.11	2.37	2.63	2.89	3.16	3.42	3.68	3.95	4.21
77	*1.95*	1.79	2.05	2.31	2.56	2.82	3.08	3.33	3.59	3.85	4.10
79	*2.00*	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00
81	*2.05*	1.71	1.95	2.20	2.44	2.68	2.93	3.17	3.41	3.66	3.90

= low risk (~ 4% per year) = moderate risk (~ 7% per year) = High risk (~ 12% per year) = severe risk (~ 18% per year)

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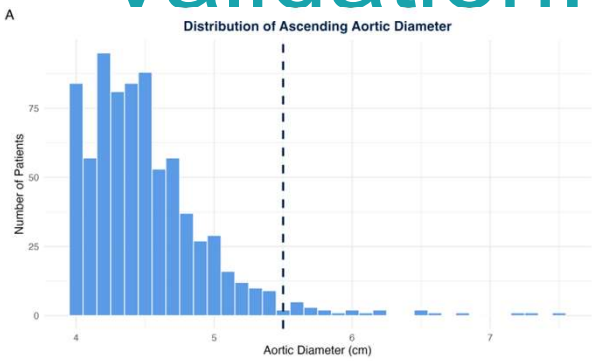
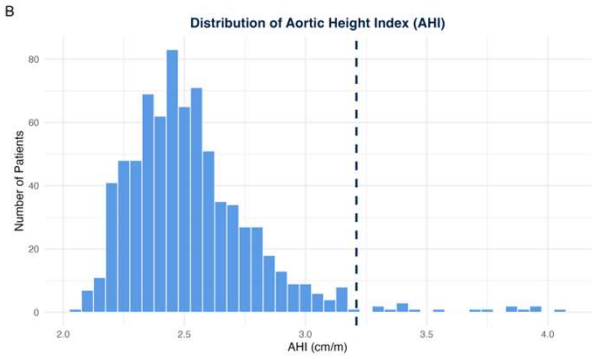
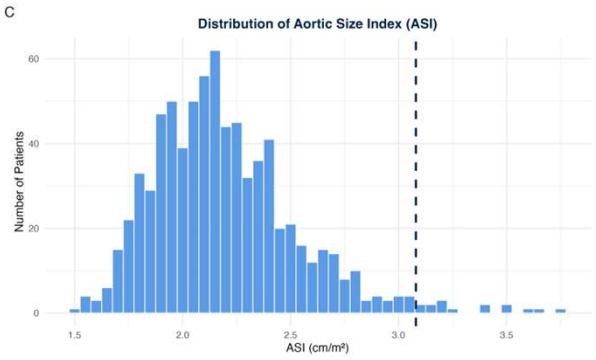
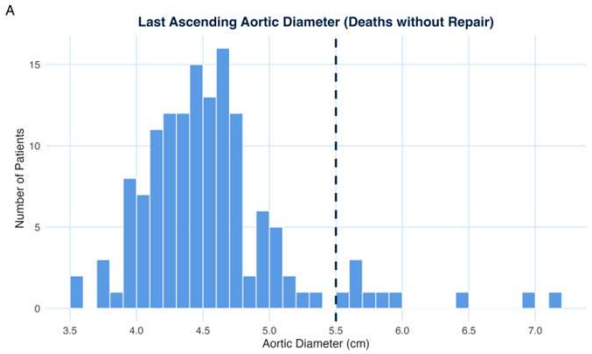
Zafar et al. JTCVS 2018;155:1938-50

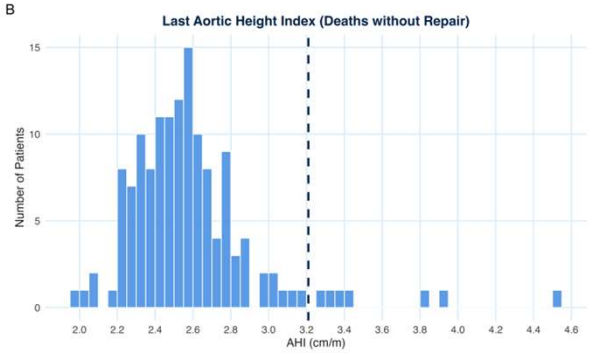
Validation: Aortic Size and Height Index

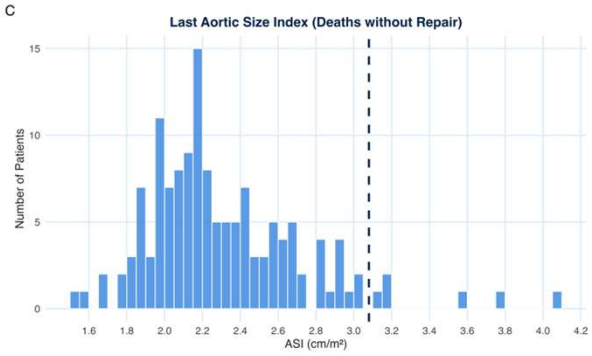












- N=764
- 98% men
- Age 76 (71-80)
- Size 4.4 (4.2-4.7) cm
- F/U 5.5 (2.3-8.5) yrs
- AHI 2.49 (2.35-2.64) cm/m
- ASI 2.15 (1.95-2.37) cm/m^2

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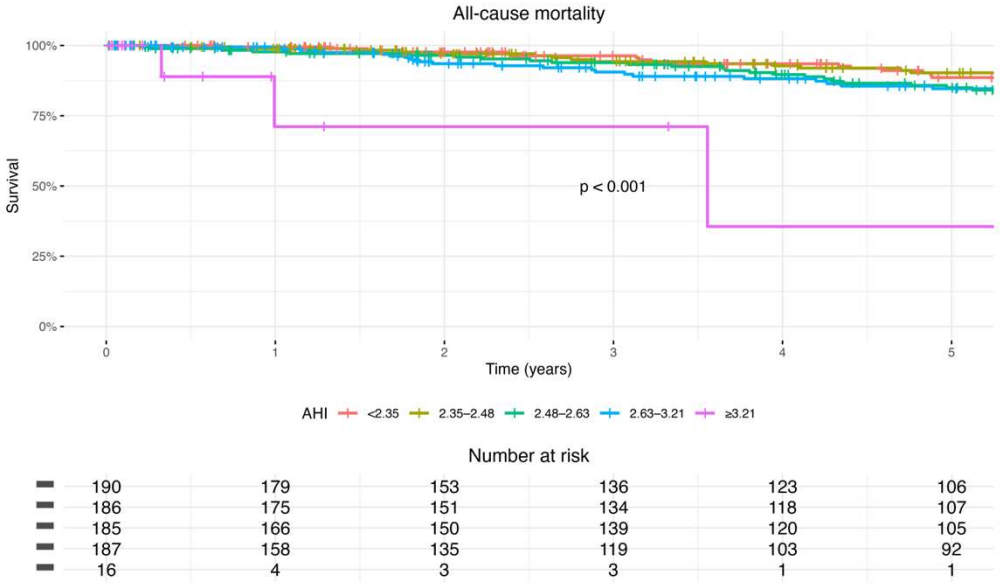
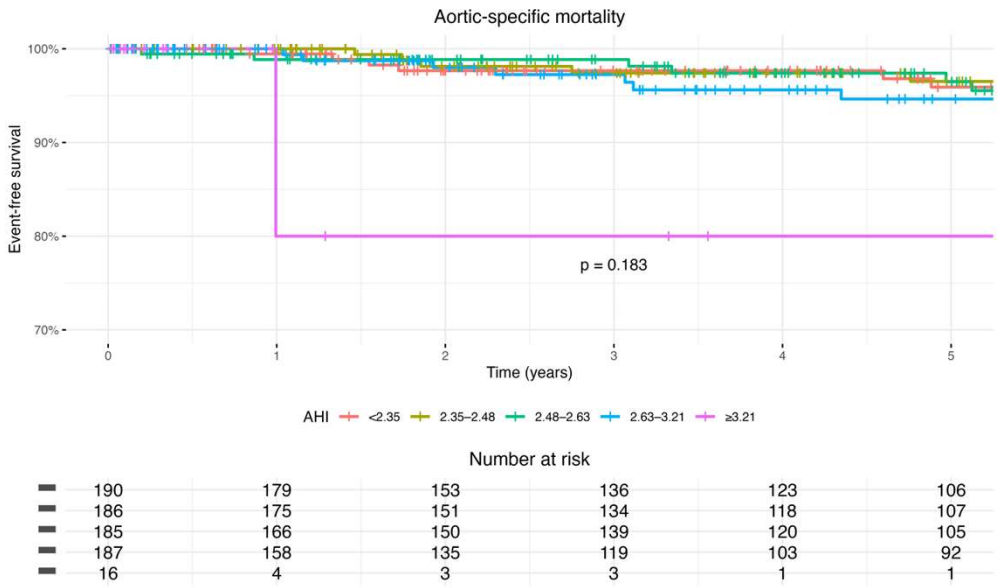
Validation: SFVA Aortic Height Index





- AHI ≥3.21cm/m increased all-cause (4x) but not aortic mortality

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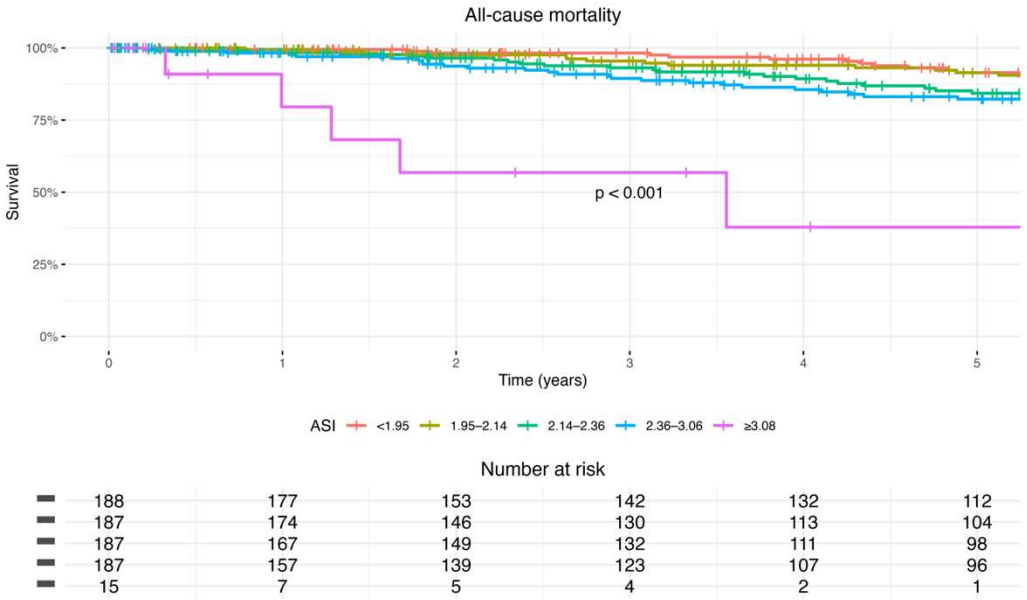
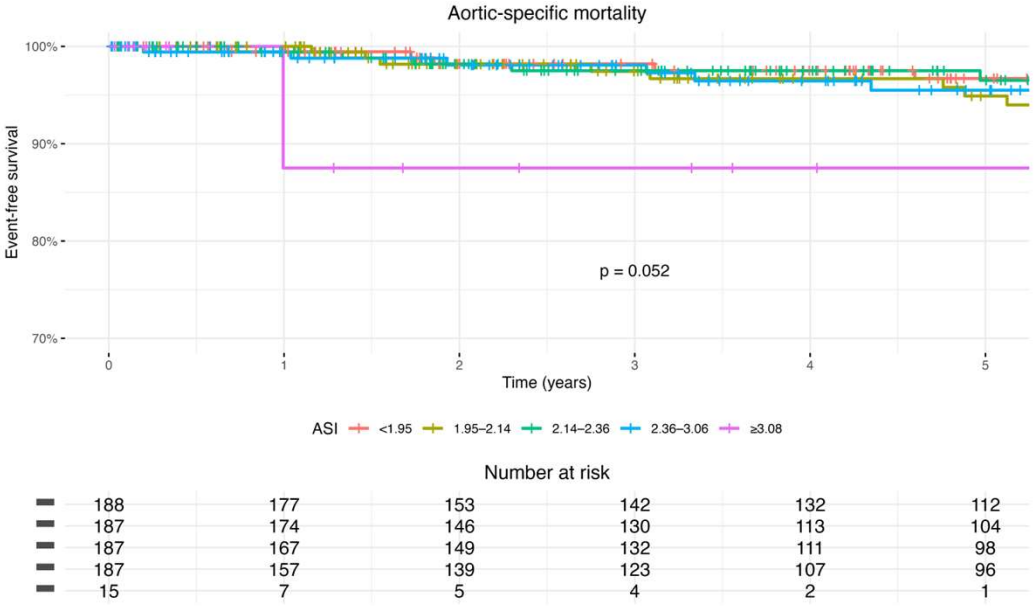
Validation: SFVA Aortic Size Index





- ASI ≥3.08 cm/m^2 increased all-cause (8x) and trend towards significance aortic mortality

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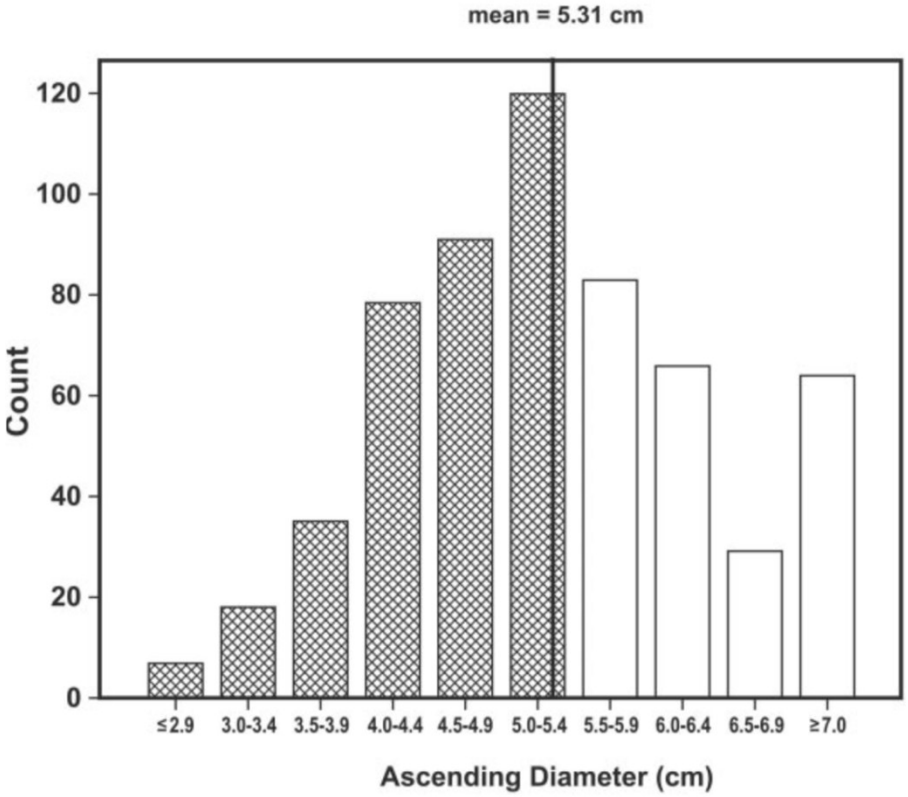
TAA Size Paradox: 5.5cm Not Good Predictor of Type A Dissection Need Personalized Modeling

- International Registry of Acute Aortic Dissection (IRAD)



Pape Circulation 2007;116:1120-1127

- Distribution of aortic size at time of type A presentation (total n=591)
- 59% of pts <5.5cm
- 40% of pts <5.0cm

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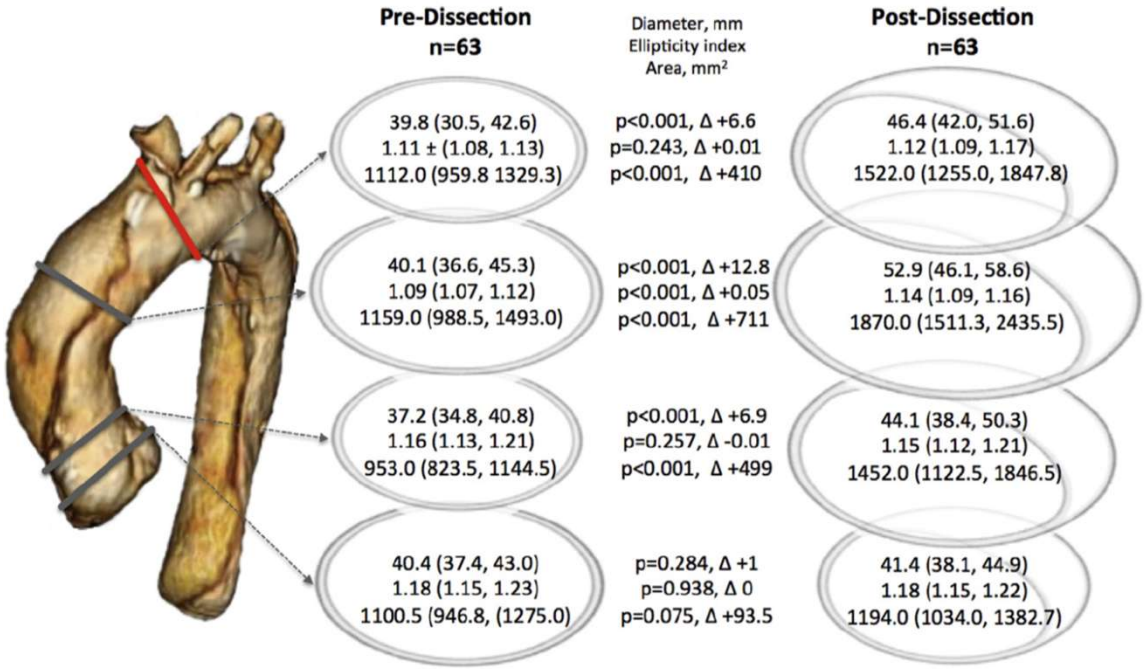
TAA Size Paradox: Pre-Dissection Size

- How Does the Ascending Aorta Geometry Change When It Dissects?



- After dissection, 44% (28/63) ≥5.5cm and 60% (38/62) ≥5.0cm

- 6 centers 2 continents
- n=1821 type A dissection pts
- CTA <2 yrs before and within 12 hrs after dissection onset
- N=63 (27 spontaneous, 36 retrograde)
- 62/63 max asc diameter <5.5cm
- Prior to AD largest diameter at mid-asc median 40.1mm (36.6, 45.3). Increased to 52.9 (46.1, 58.6)

United States Department of Veterans Affairs

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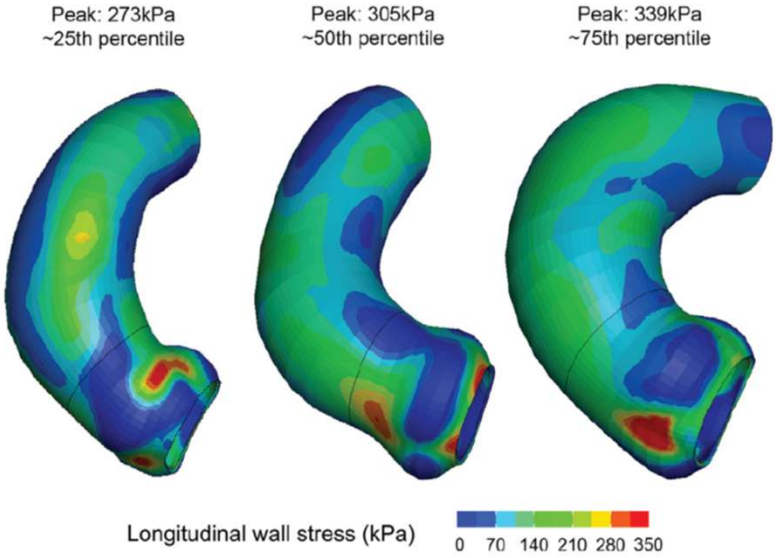
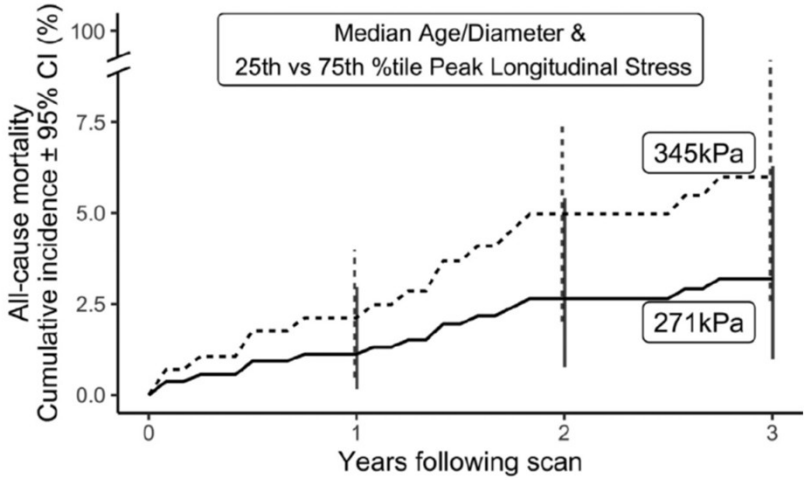
Rylski JACC 2014;63:1311-9

Peak Personalized TAA Wall Stresses & 3-yr Mortality

- Peak Longitudinal Stresses Associated with 3-yr All-Cause Mortality





Number at risk	273	214	171	148
Cumulative repairs	–	51	52	53
Cumulative deaths	–	6	13	15

- N=273 veterans, 17% BAV
- Median diameter 4.5 (4.3, 4.9). 9% (25/273 pts) ≥5.5cm
- Median f/u 3 yrs
- During f/u 19% (53/273) elective TAA repair with 0% mortality
- All-cause mortality 5.5% (15/273)

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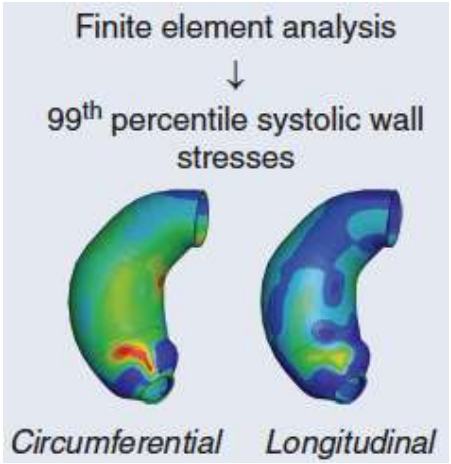
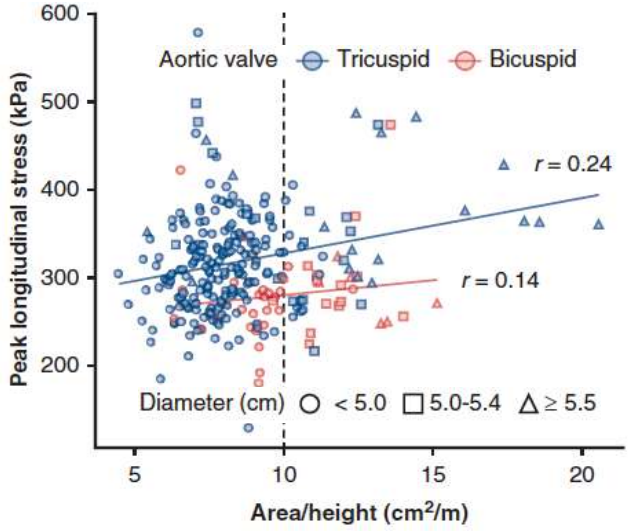
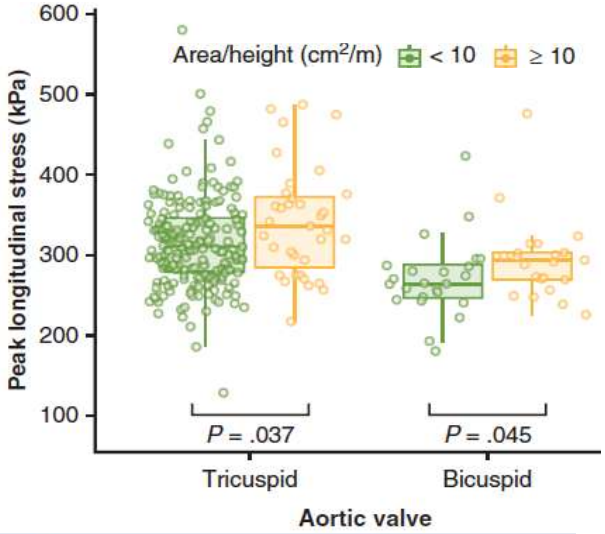
Tseng et al. Semin Thorac Cardiovasc Surg 2022. S1043-0679(22)00133-2

Peak Wall Stresses vs Area/Ht ≥10cm^2/m

- All-Cause Mortality







- N=270 pts: 46 BAV, 224 TAV
- A/H ≥10cm^2/m: 68% 5.0-5.4cm, 83% ≥5.5cm
- Peak long stress ≥355kPa independently associated with death, not Area/Ht

Adjusted Model	Hazard Ratio (95% CI)	P
Age per 9 years	2.20 (1.18-4.09)	.013
Area/height per 2.33 cm^2/m	1.12 (0.58-2.16)	.739
Peak long. stress per 73 kPa	1.78 (1.04-3.02)	.035

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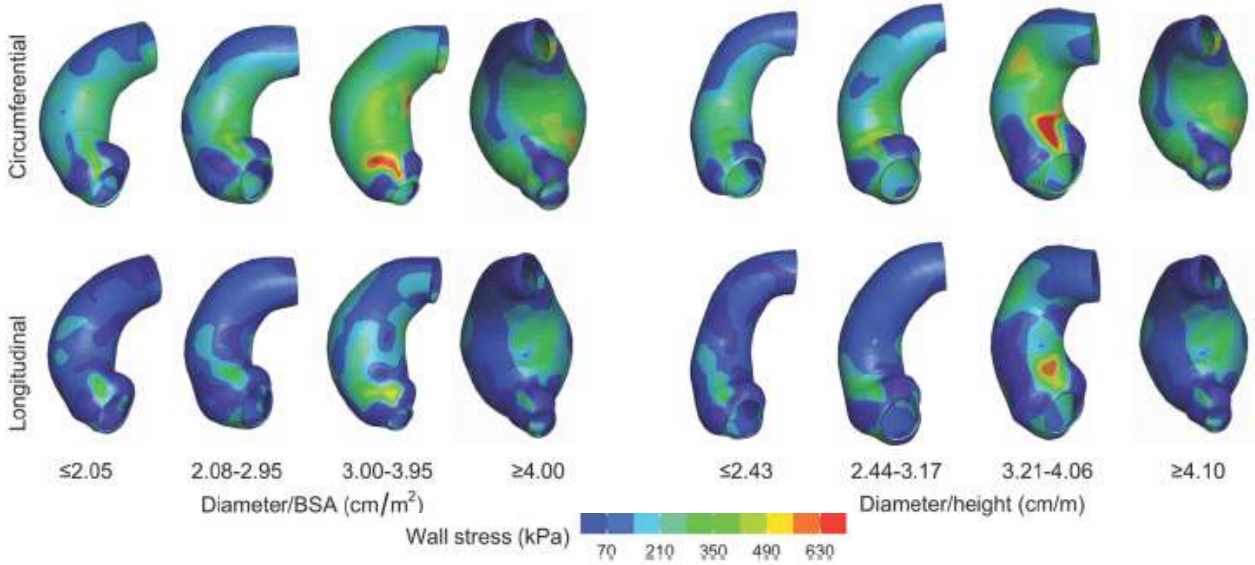
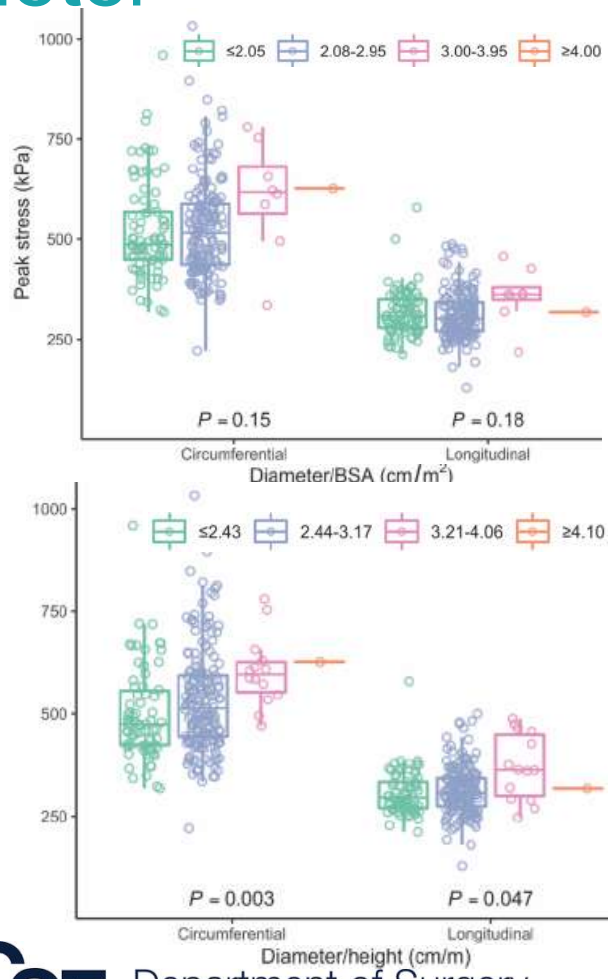
- Tseng et al. J Thorac Cardiovasc Surg 2023;166:1583-93

Peak Wall Stress vs Indexed Diameter

- All-Cause Mortality





- N=253 veterans, 98% male
- Median diameter 4.6cm
- Median Diameter/BSA 2.21 cm/m^2
- Median Diameter/ht 2.57 cm/m

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Tseng et al. Int J Cardiol Heart Vasc 2024;51:101375

Peak Wall Stress vs Indexed Diameter

- All-Cause Mortality with ATAA repair as Competing Risk

Adjusted model 3		
Age	1.91 (1.09–3.35)	0.04
Diameter/BSA	2.03 (1.10–3.74)	0.04
Peak longitudinal stress	1.81 (1.09–3.00)	0.04
Adjusted model 4		
Age	2.13 (1.20–3.81)	0.04
Diameter/height	1.12 (0.63–1.99)	0.76
Peak longitudinal stress	1.78 (1.08–2.92)	0.04

- Indexed diameter added <2% of new pts for repair indication
- Peak longitudinal stress ≥354kPa added 35% new pts for repair
- D/Ht not predictive of all-cause mortality, but D/BSA was predictive
- Peak long stress independently predictive of mortality

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Tseng et al. Int J Cardiol Heart Vasc 2024;51:101375

Conclusions

- Given the dissection size paradox, better predictors of dissection are required than the present diameter-based guidelines
- Peak longitudinal stress is predictor of all-cause mortality independent of diameter and diameter/BSA
- Personalized modeling and risk prediction holds the promise to tailor timing of prophylactic surgery for those aTAA patients at higher risk of dissection, rupture, or death.

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- Lab:
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- Collaborators: Marko Boskovski, MD
- Lab: Siavash Zamirpour, Axel Cesar-Gomez, Emily Huang

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