

TCT 2025: The “Reality” of Surgical Aortic Root Enlargement

National and Statewide Trends

Bo Yang, MD, PhD



Disclosure of Relevant Financial Relationships

Within the prior 24 months, I have had a financial relationship with a company producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients:

<u>Nature of Financial Relationship</u>	<u>Ineligible Company</u>
Consultant/Teaching	Balance
Teaching	Artivion
Travel/Teaching	Edwards Lifesciences
Travel/Teaching	Ethicon, Inc.
Advising Fees	Medtronic, Inc. Corcym

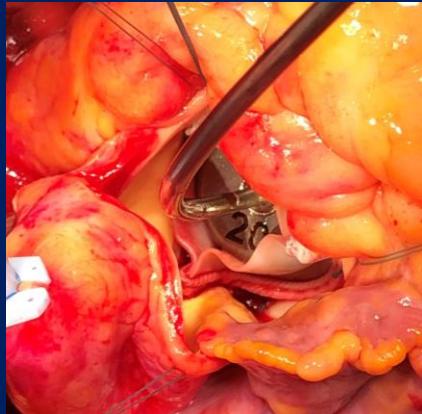
Normal aortic annulus is Small (17-25 mm):

- Male: 23.1 ± 2.0 mm (n=2,214);
- Female: 21.0 ± 1.8 mm (n=1,156) (Capps SB, JTCVS 2000)

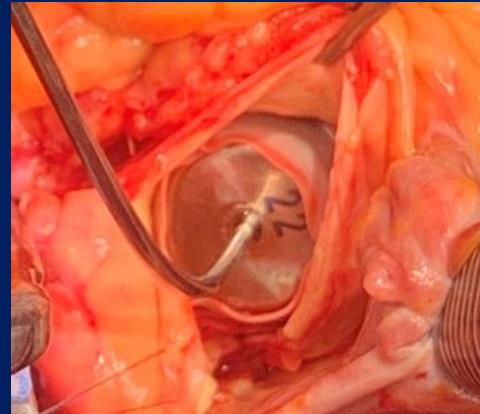
Most common SAVR valve used: size 21-23

- PARTNER 1, 2, 3,
- Pivotal trial, Evolut low risk trial
- SURTAVI trial
- NOTION trial

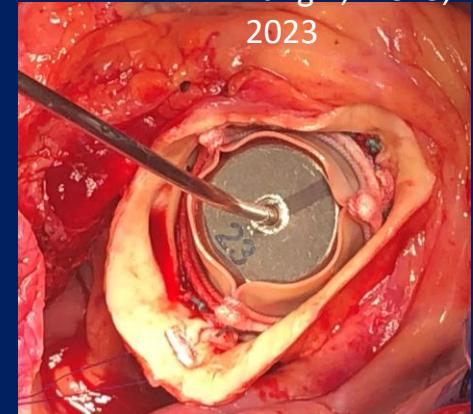
The inner diameter of the prosthetic valve is 5-7 mm smaller than the label



25 Valve – 20 mm



27 Valve – 22 mm



29 Valve – 23 mm



23 Valve – 16mm



21 Valve – 14mm



19 Valve – 14mm

Yang B, JTCVS,
2023

Table 2 Effective orifice diameters measured under steady flow conditions

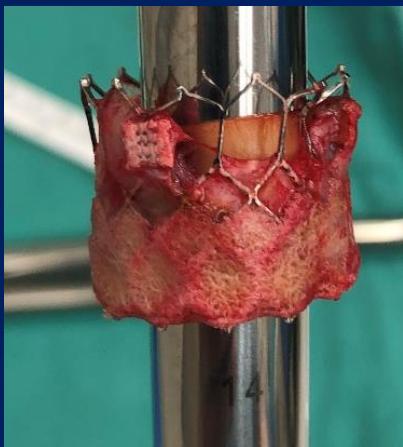
Valve model	Effective orifice diameter at 25 L/min (mm) [†]				Mean ± SD (mm)
	Laboratory 1	Laboratory 2	Laboratory 3	Laboratory 4	
Magna Ease/Theon					
19 mm	14.8	14.8	15.0	15.1	14.9±0.1
23 mm	16.7	17.1	17.2	16.8	17.0±0.2
29 mm	22.9	22.9	23.4	23.0	23.1±0.3
31 mm	23.5	24.4	24.3	23.8	24.0±0.4
Avalus					
21 mm	15.3	15.4	15.5	15.3	15.4±0.1
25 mm	17.5	17.7	17.6	17.6	17.6±0.1
27 mm	20.5	21.1	21.2	20.7	20.9±0.3

Wu et al, Ann Cardiothorac Surg 2024 – FDA official publication

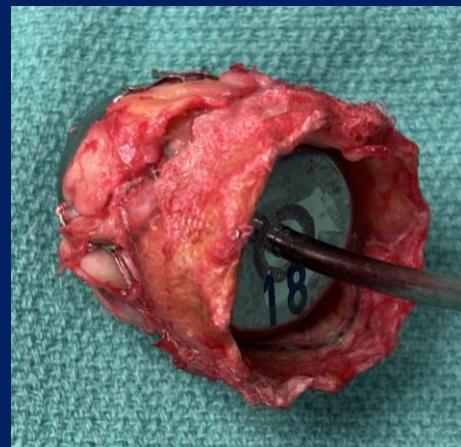
The inner diameter of TAVR valve is small too



23 Sapien 14 – 15 mm

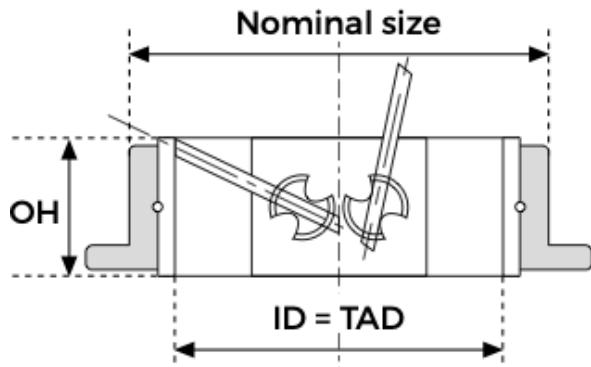


26 Sapien – 18 mm



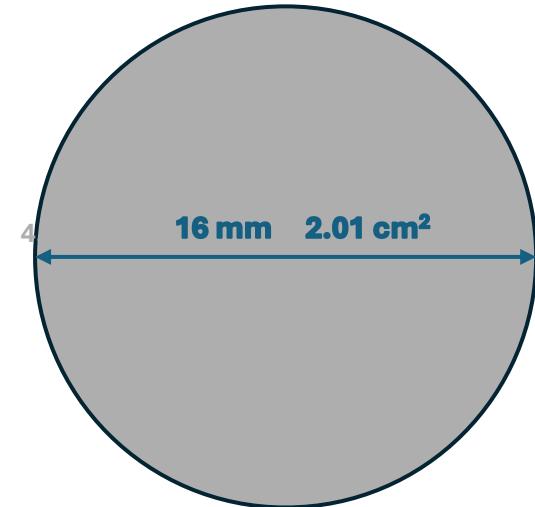
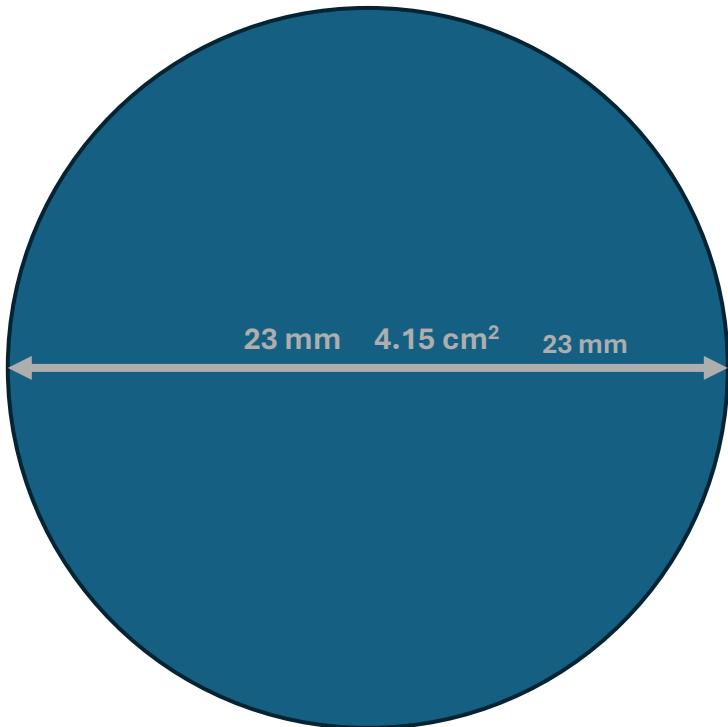
23 Evolut – 15 mm





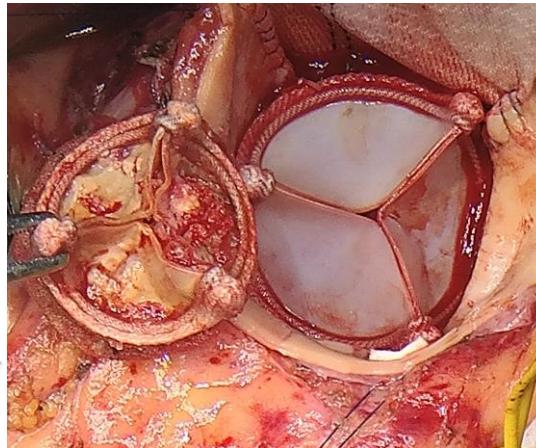
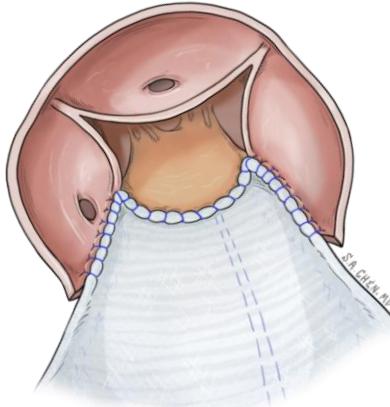
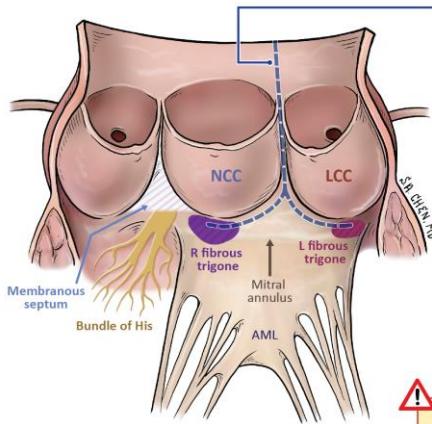
Nominal size	TAD	ID	OH	GOA	EOA
19	14.7	14.7	6.2	1.59	1.0 ¹
21	16.7	16.7	6.6	2.07	1.4 ²
23	18.5	18.5	7.3	2.56	1.9 ²
25	20.5	20.5	7.7	3.16	2.2 ²
27	22.5	22.5	8.4	3.84	2.9 ²

A 52% Reduction in Effective Area!



Y-incision AAE better than SAVR or TAVR alone

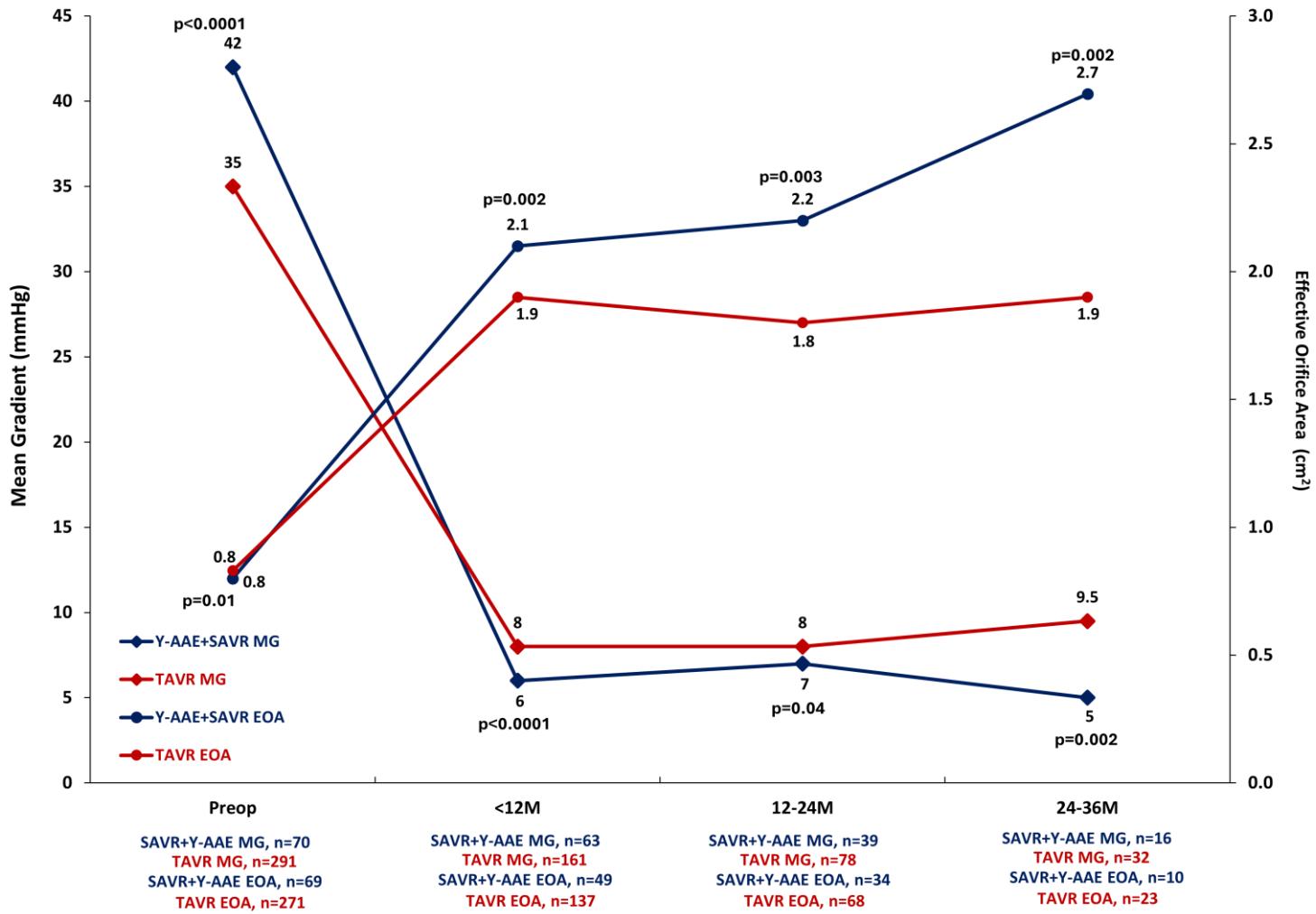
Y-INCISION AAE



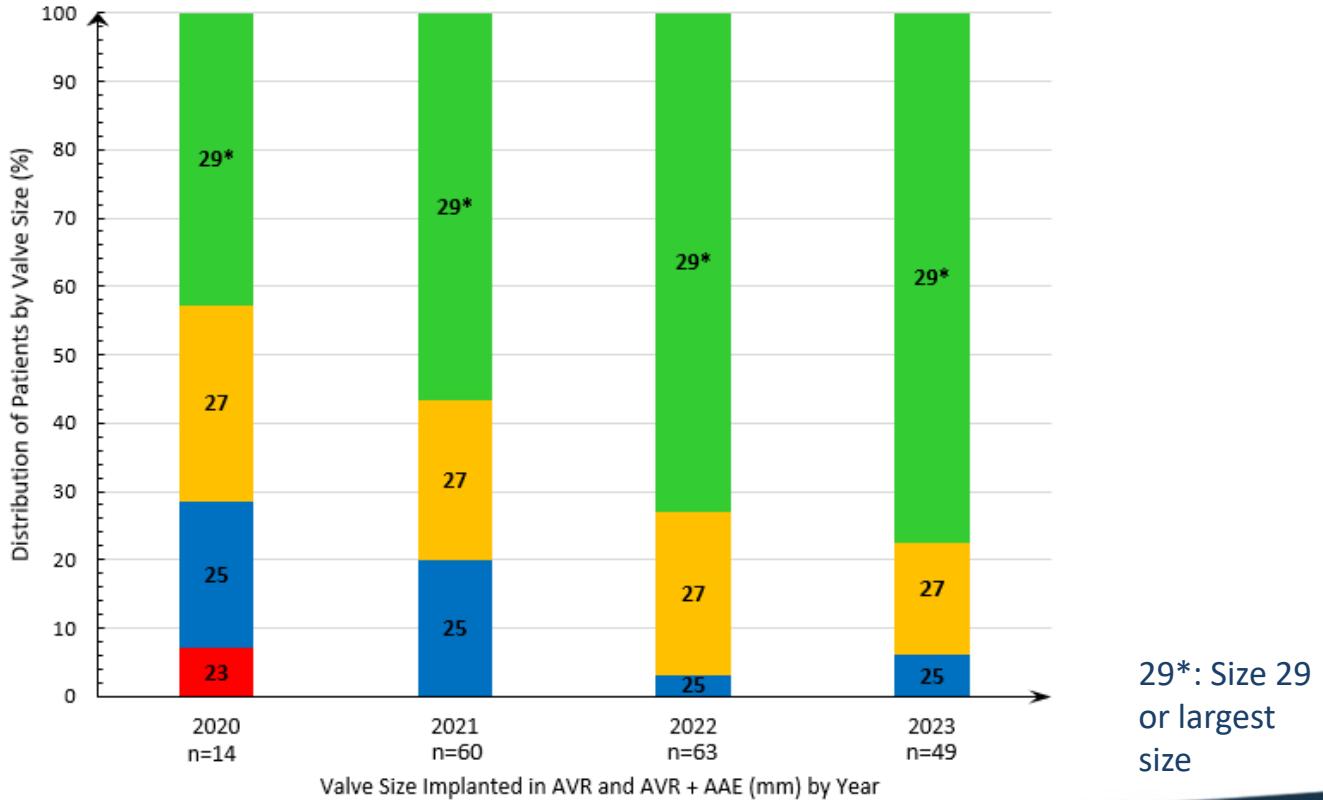
Y-incision AAE – Aug 2020

Size 21 to size 29

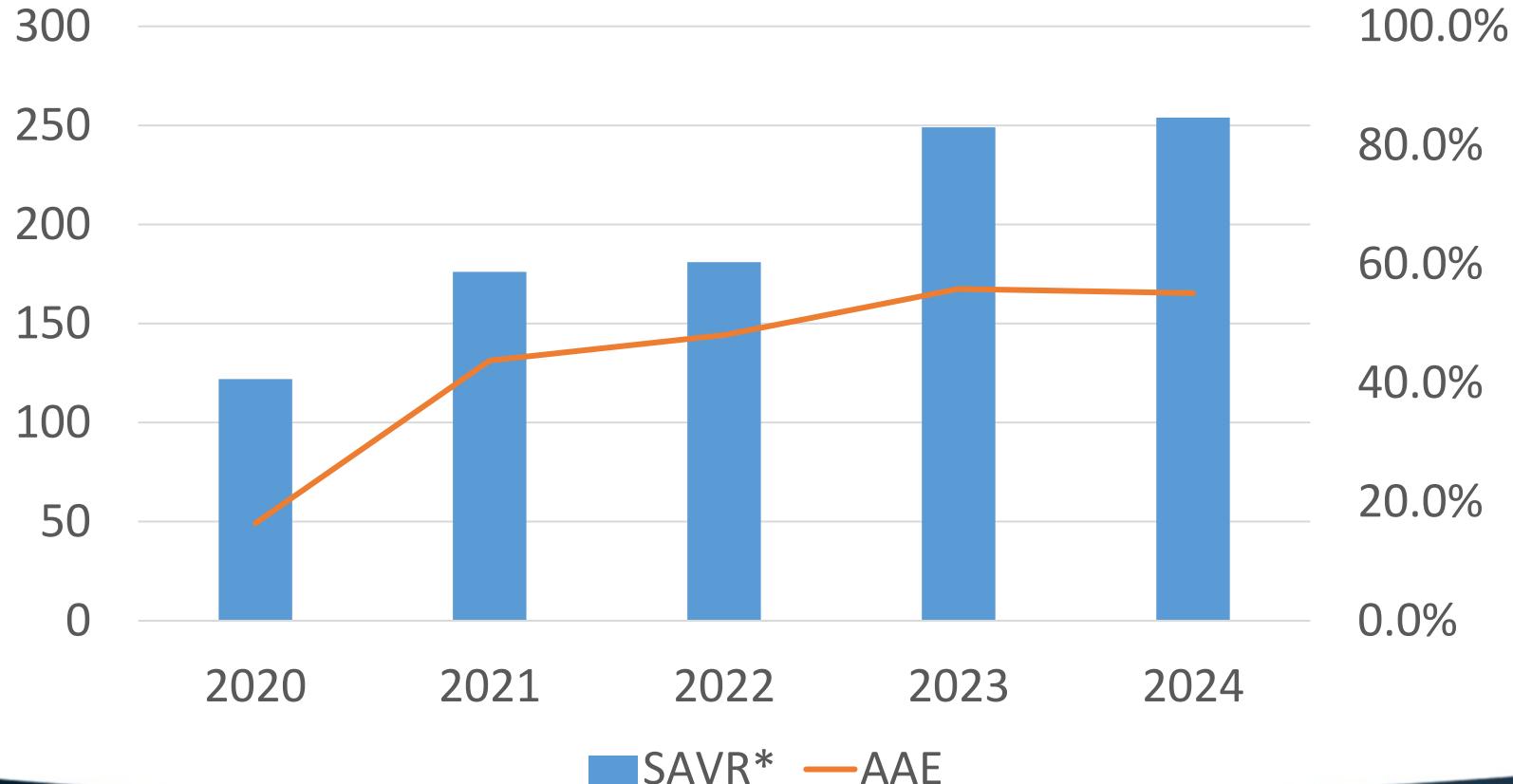
Sapien 23 to size 25



❖ All patients of AVR or AVR + AAE and any other concomitant operations
(8/2020 – 9/2023, n=186, AVR = 67 (36%); AVR +AAE = 119 (64%))



% of AAE in SAVR (AVR or AVR +CAB)



Growth of Aortic Annular Enlargement in the state of Michigan

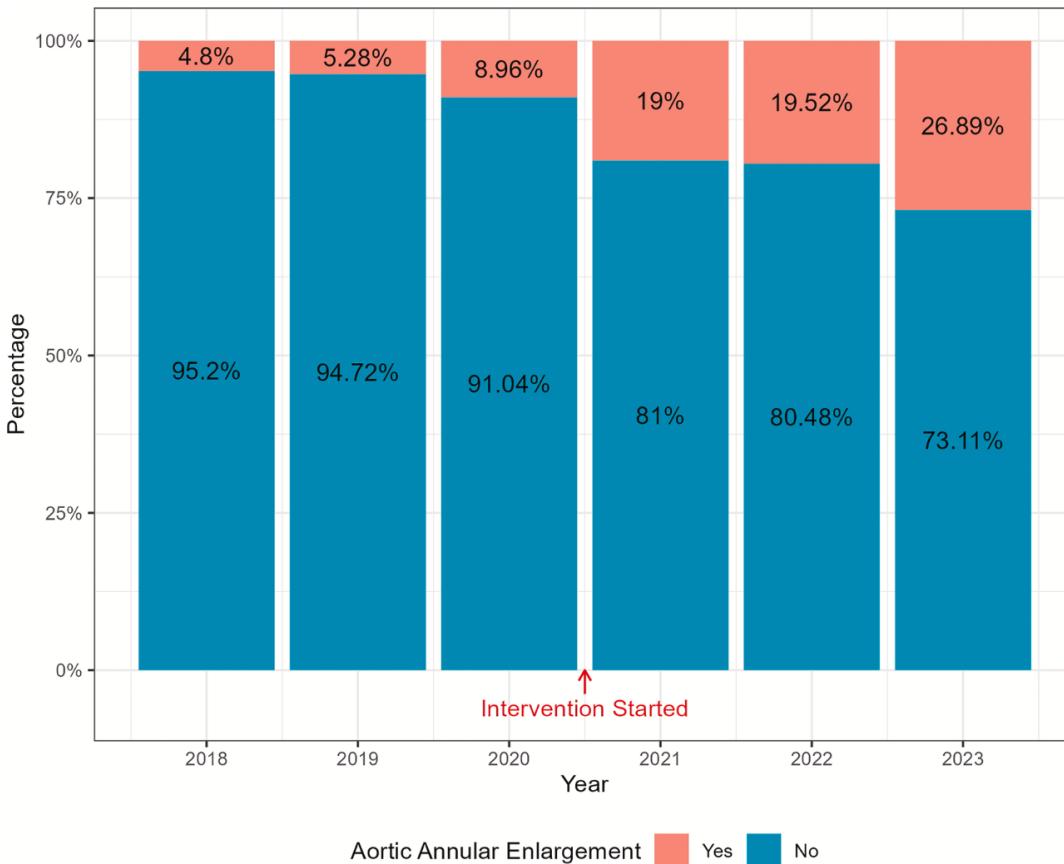


FIGURE 2 Graph demonstrating the significantly different rates of aortic annular enlargement adoption per year ($P < .0001$).

Growth of Y-incision Aortic Annular Enlargement in the state of Michigan

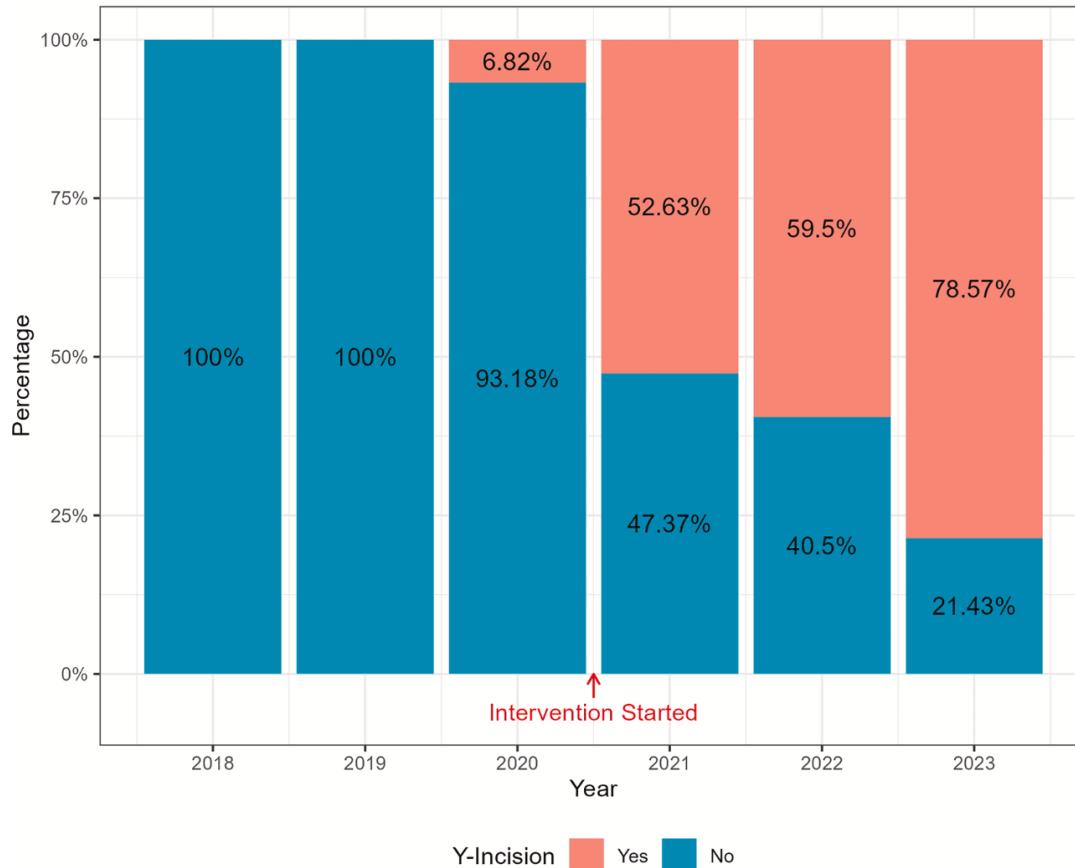


FIGURE 3 Graph demonstrating the significantly different rates of the Y-incision technique adoption per year ($P < .0001$).

Changes of valve sizes implanted in the state of Michigan

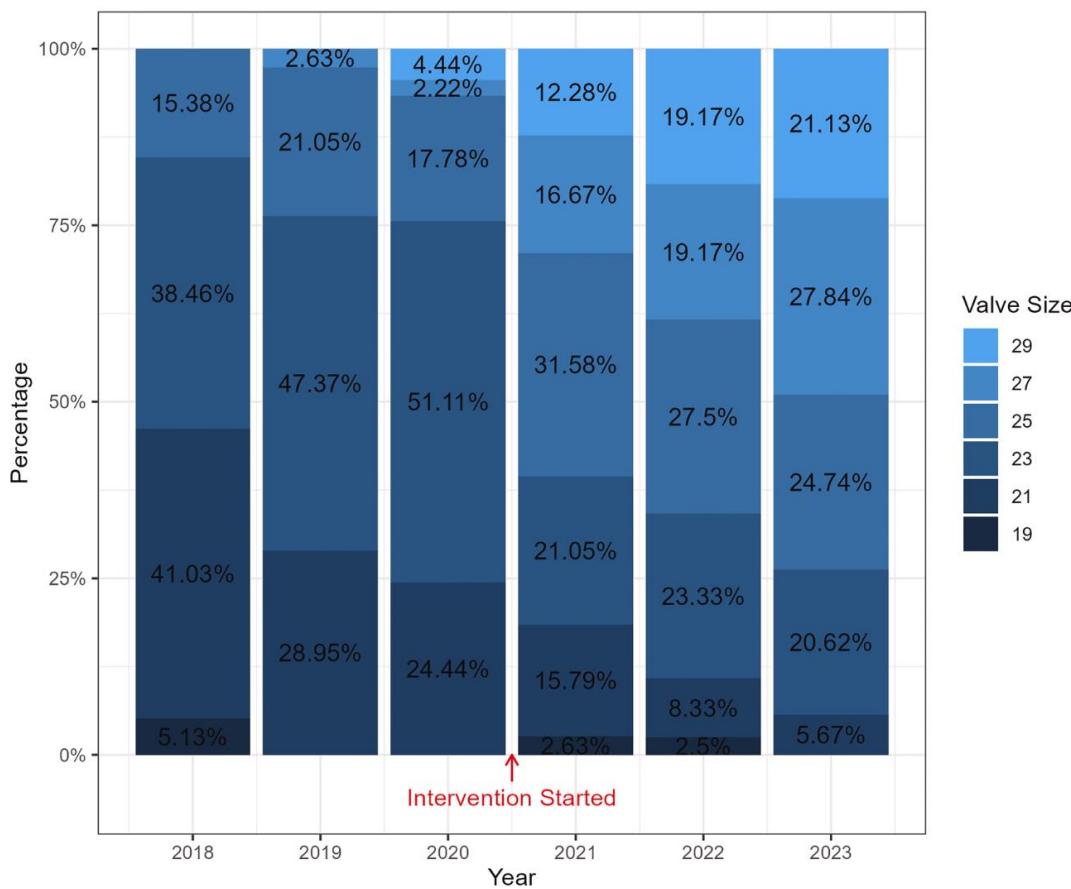
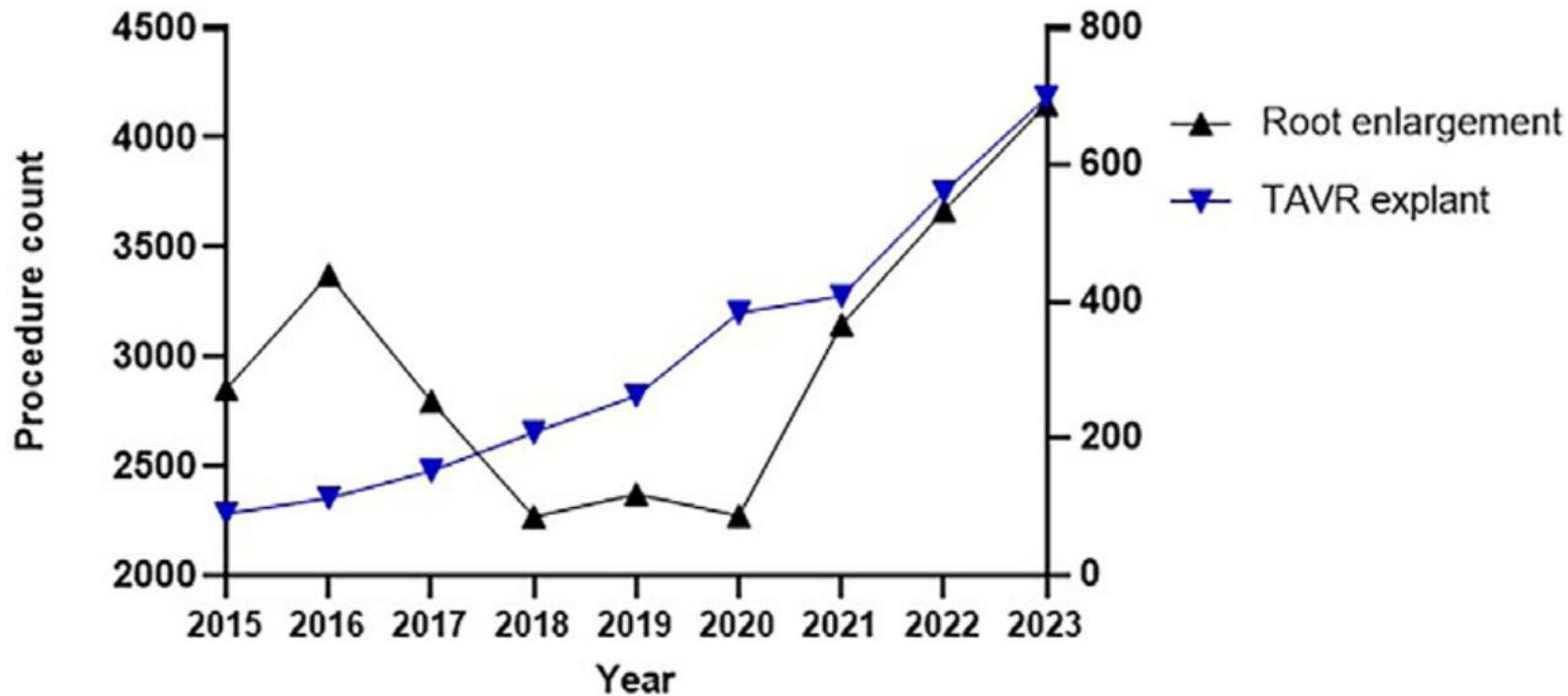
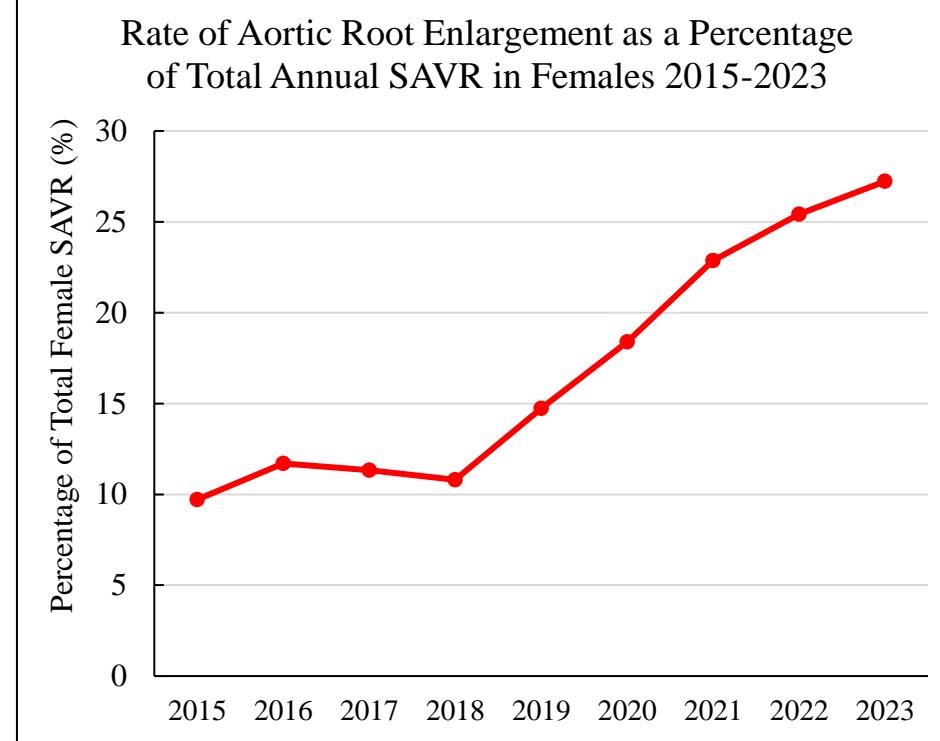
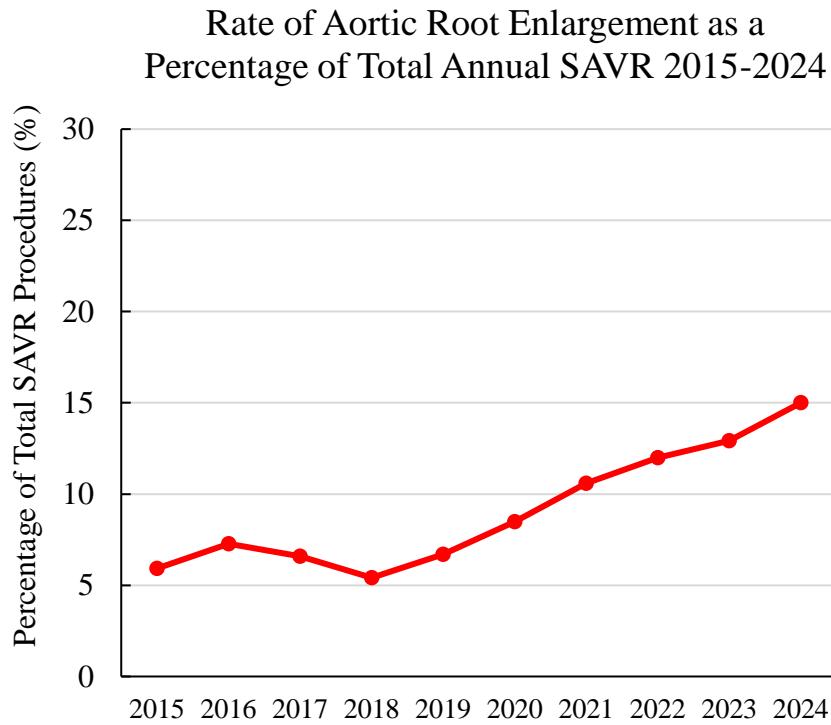


FIGURE 4 Graph demonstrating the significantly different rates of the implanted valve sizes per year ($P < .0001$).

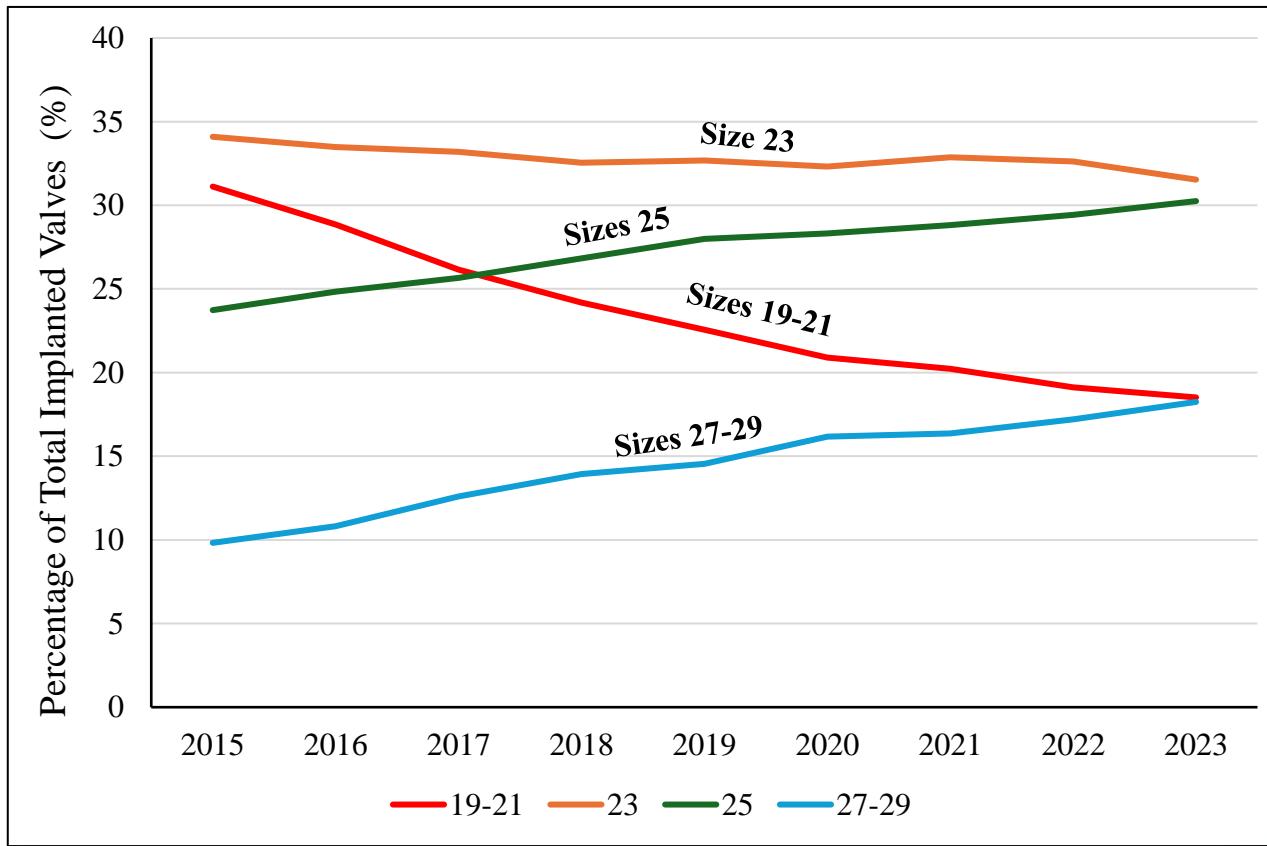
Trend of Aortic Root Enlargement from STS database



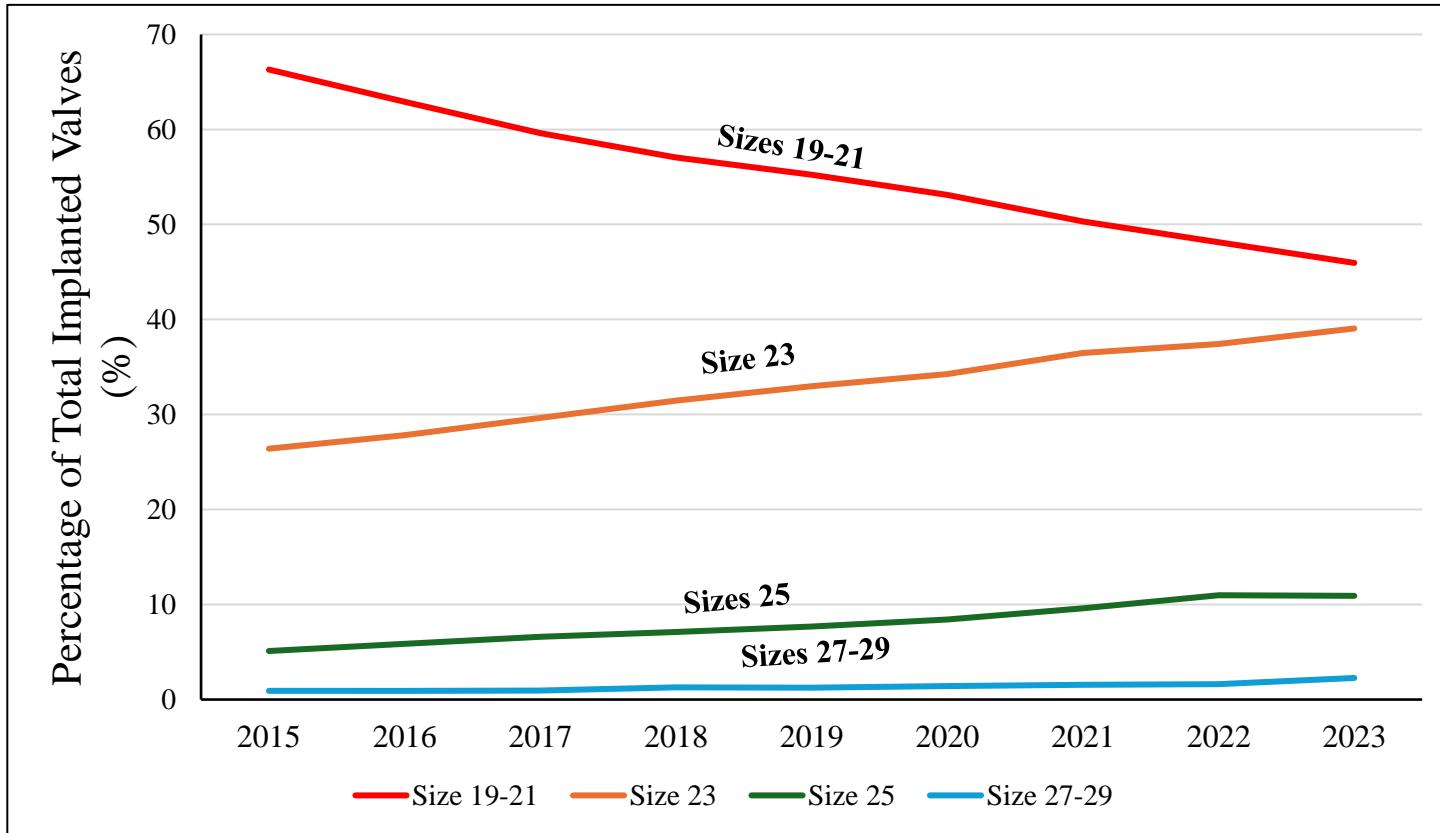
National Growth of Aortic Root Enlargement 2015-2024



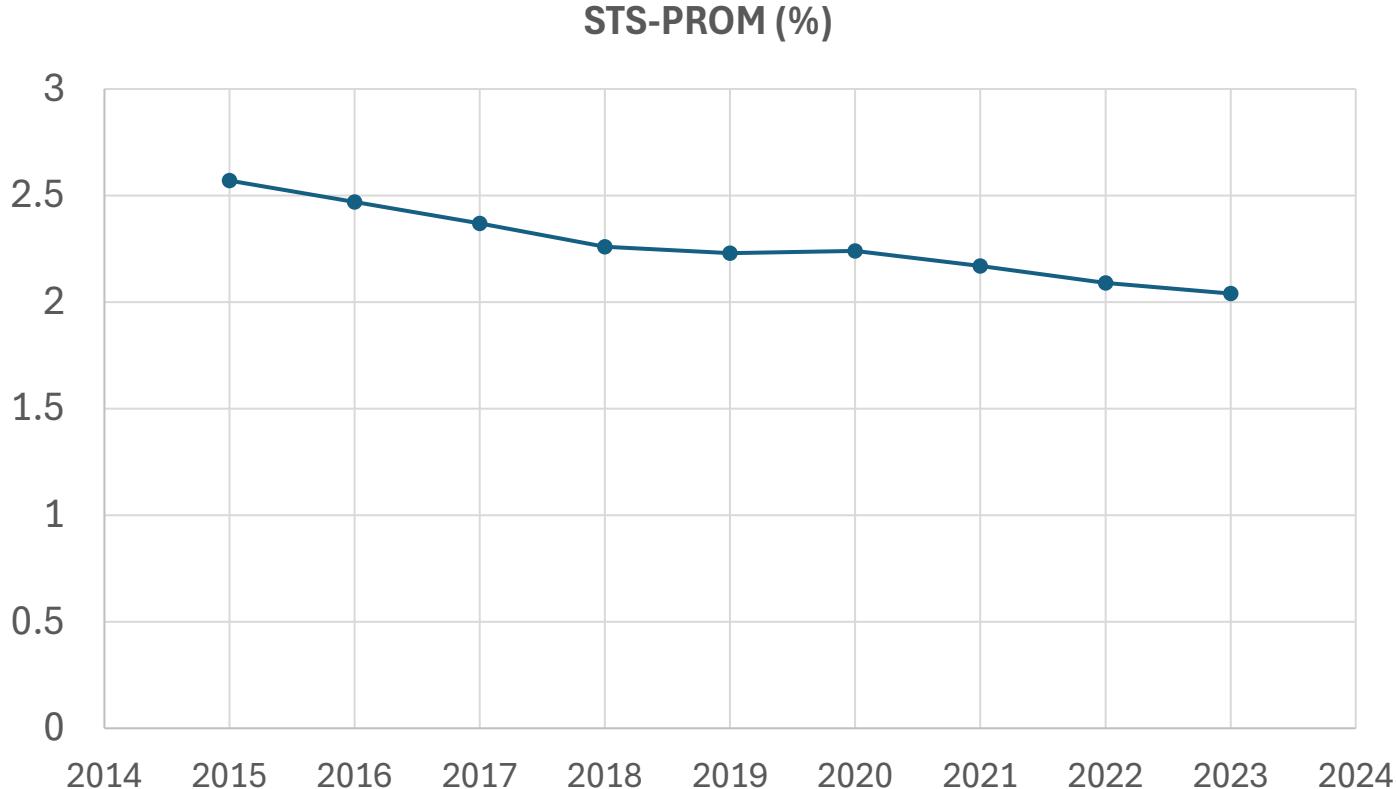
SAVR Prosthesis Sizes in the US 2015-2023



SAVR Prosthesis Sizes in US Females 2015-2023



Operative Mortality of SAVR is Decreasing



Summary

- Aortic annular/root enlargement is becoming more widely adopted in the state of Michigan and across the US, and has been proved to be safe and generalizable.
- Larger valve sizes (size 25-29) are being implanted more commonly while smaller sizes are seeing a decline (size 19-23)
- ARE should be considered for every AVR in patients with normal annulus like LIMA to LAD in CABG