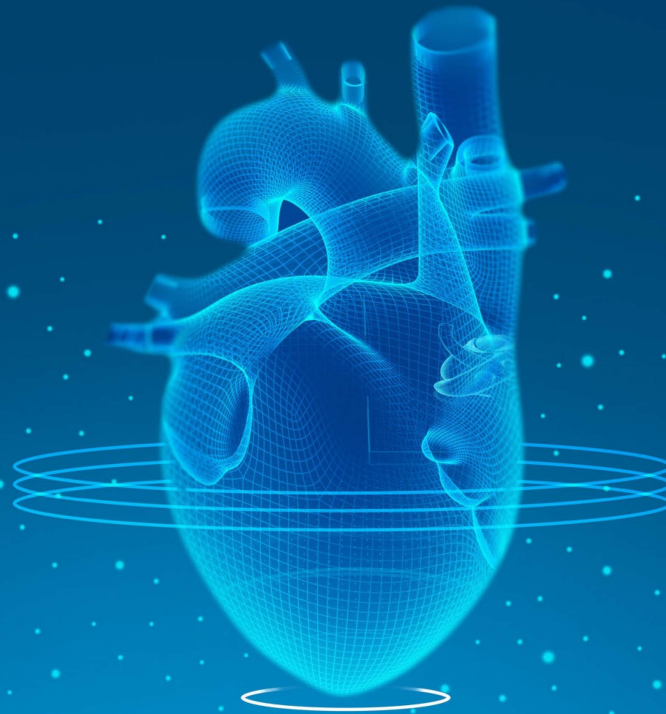




GRAND ROUNDS



Updates on TAVR for Bicuspid Aortic Stenosis in 2022

Yashasvi Chugh, MD
Structural Interventional Cardiology Fellow

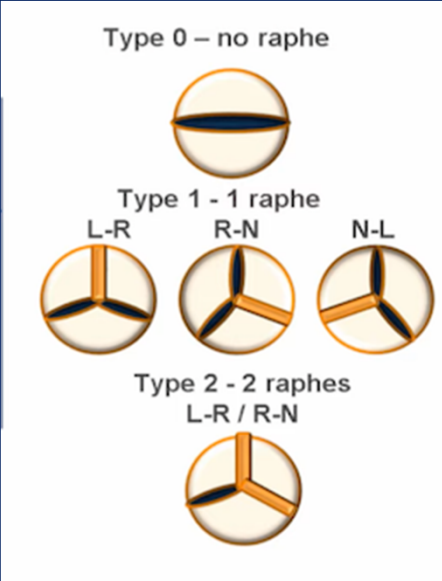


1

BACKGROUND

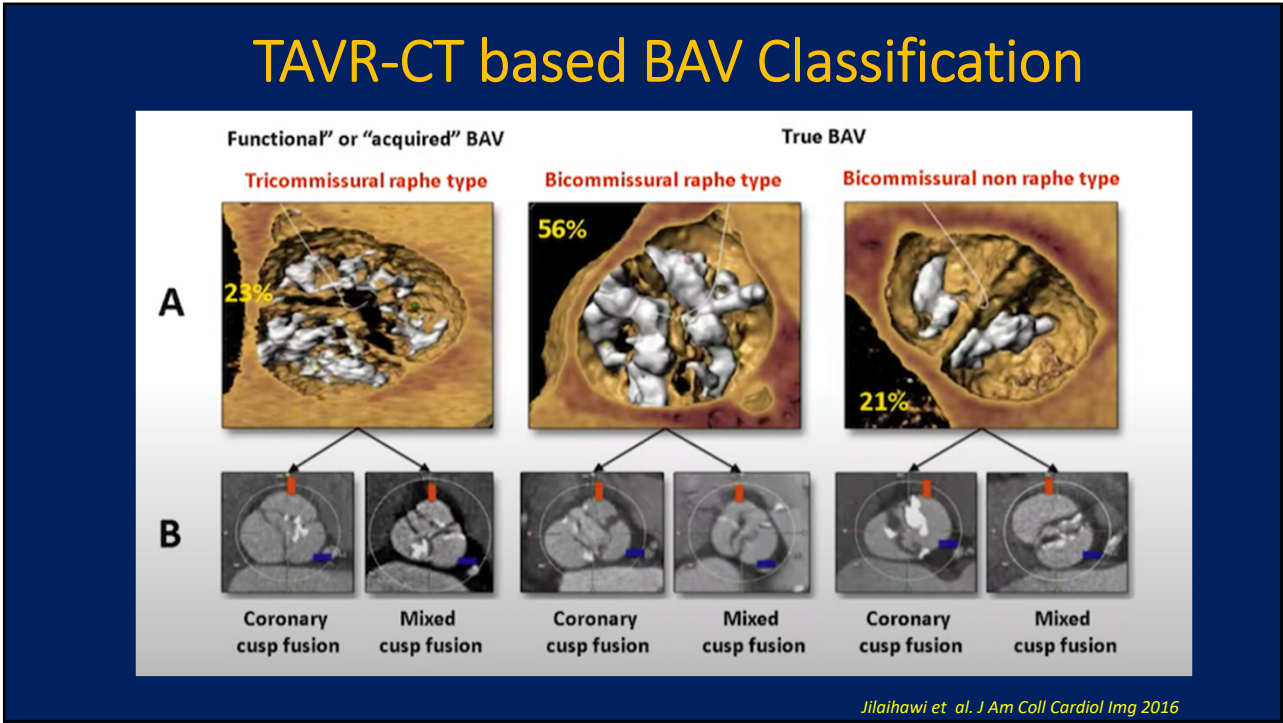
1-2% of population has BAV
3-4% of patients undergoing TAVR
No dedicated RCT: TAVR vs SAVR

Type 0 = 12%
Type 1= 86%
Type 2=2%

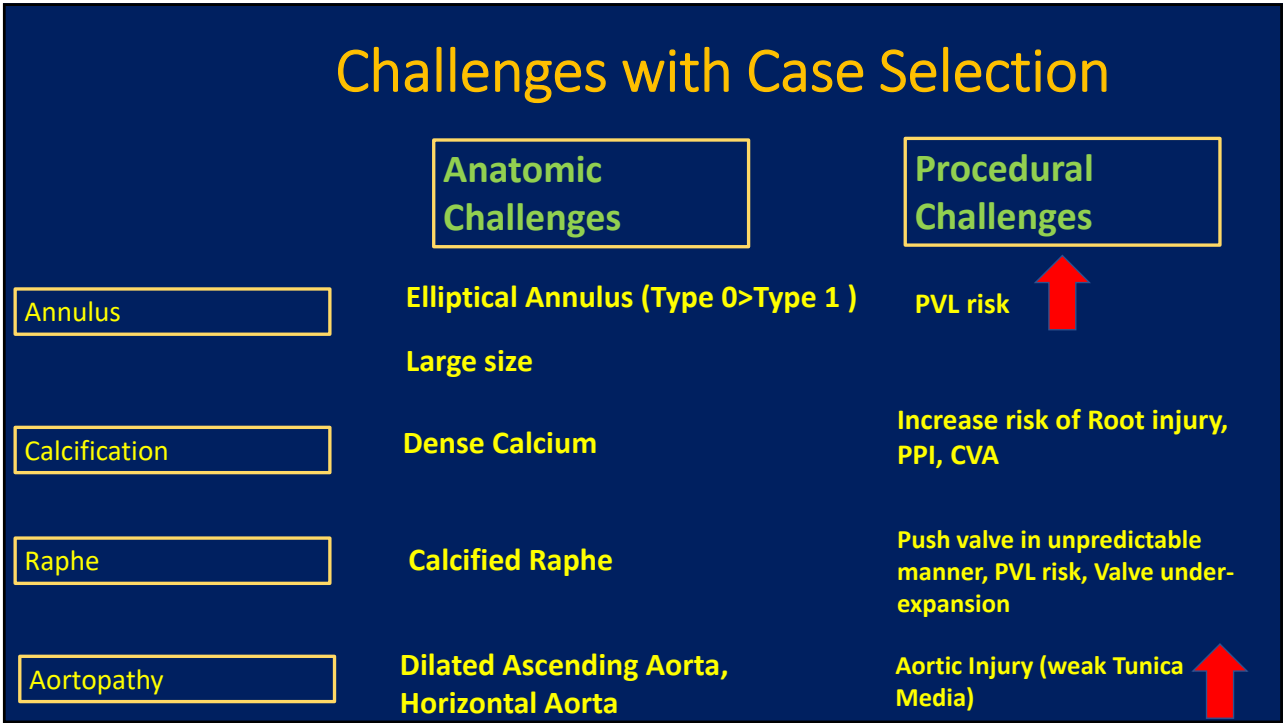


Sievers HH. J Thorac Cardiovasc Surg 2007

2



3

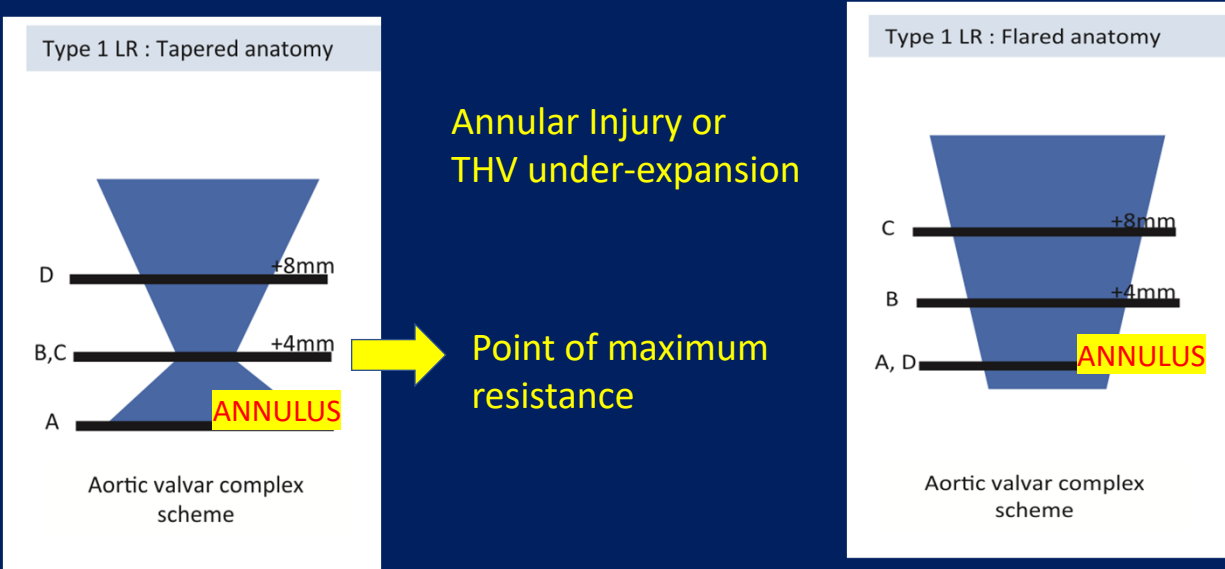


4

Case Planning

5

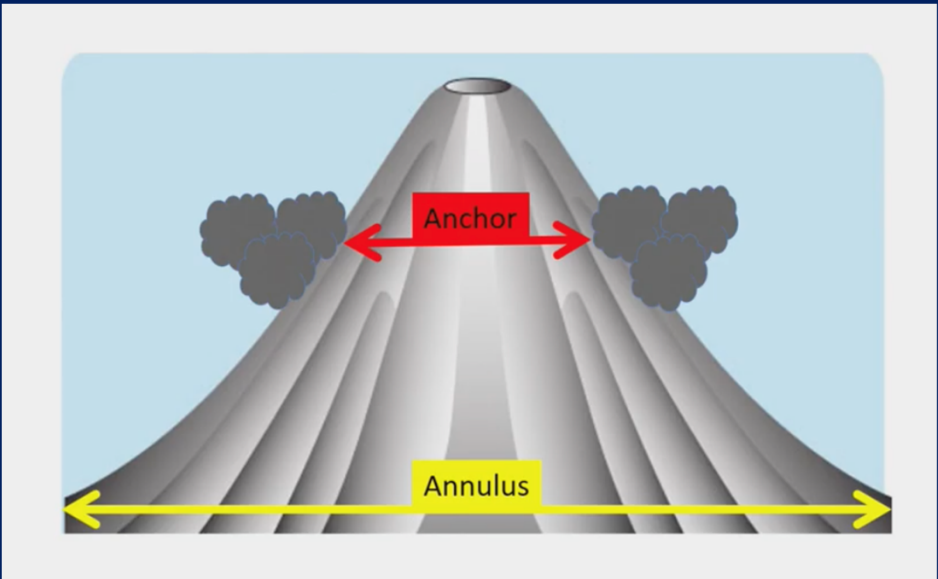
1. Bicuspid Valve Anatomy and Valve Sizing



Tchetche D. *Circ Cardiovasc Interv.* 2019;12:e007107

6

Bicuspid AS-
Anchor is often
above the
annulus

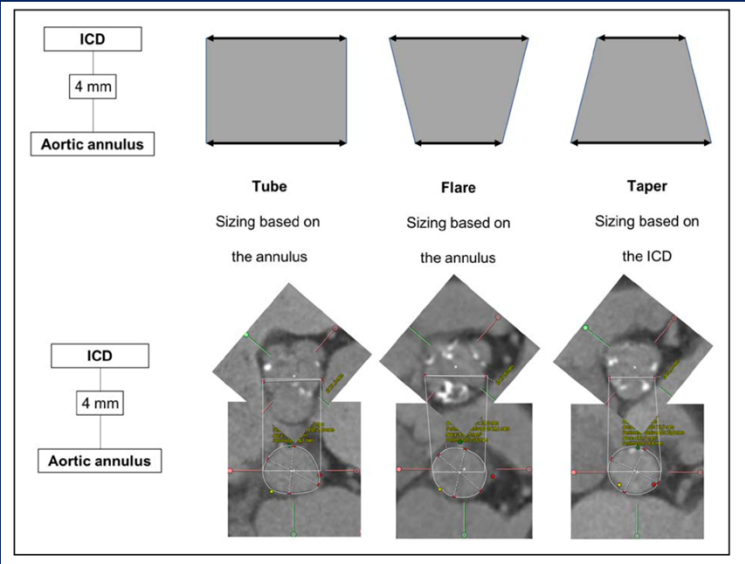


Tricuspid AS- TAVR sizing based on Annulus area or
perimeter

7

BAVARD Registry

Use of the ICD
measurements
when sizing
TAVR valves for
Type 0 and 1
Bicuspids



Tchetche D. *Circ Cardiovasc Interv.* 2019;12:e007107

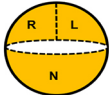
8

BAVARD Registry

**With limited
oversizing (3-4%)**


**ICD
measurements
could be used in
grey zone cases**

Type I bicuspid aortic valve
are frequent




86.1%

Annulus-based sizing for TAVR
Is usable in 88% the cases



Prosthesis underexpansion
is a constant finding

Second generation TAVR devices may
achieve circularity in bicuspid valves



Mean ellipticity index 1.17

2nd Gen valves: Evolut R, Sapien 3 and Lotus

Tchetche D. Circ Cardiovasc Interv. 2019;12:e007107

9

BIVOLUT-X Registry


**Annulus sizing
or Combined
sizing
(Annulus+ICD)
are equally
efficient for
prosthesis
selection**

Clinical outcomes	N = 151	Annular sizing N = 78	Combined sizing N = 73
All-cause death, n (%)	5 (3.3)	3 (3.8)	2 (2.7)
Cardiovascular death (n,%)	3 (1.9)	2 (2.5)	1 (1.4)
Disabling stroke, n (%)	5 (3.3)	3 (3.8)	2 (2.7)
Non-disabling stroke, n (%)	1 (0.7)	1 (1.3)	0(0)
Major vascular complication, n (%)	7 (4.6)	4 (5.1)	3 (4.1)
Pacemaker implantation, n (%)	29 (19.6)	13 (16.7)	16 (21.2)

EOA 2.1 cm²
Mean gradient 7.3 mmHg
No moderate-severe or severe AR

Evolut Pro (23,26 or 29mm) or Evolut R (34mm)

No significant p value between sizing strategies




Tchetche D. EuroPCR 2020

10

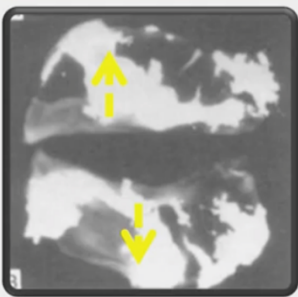
2. Bicuspid vs Tricuspid Calcification Burden

Calcification in leaflet tips and base

Tricuspid



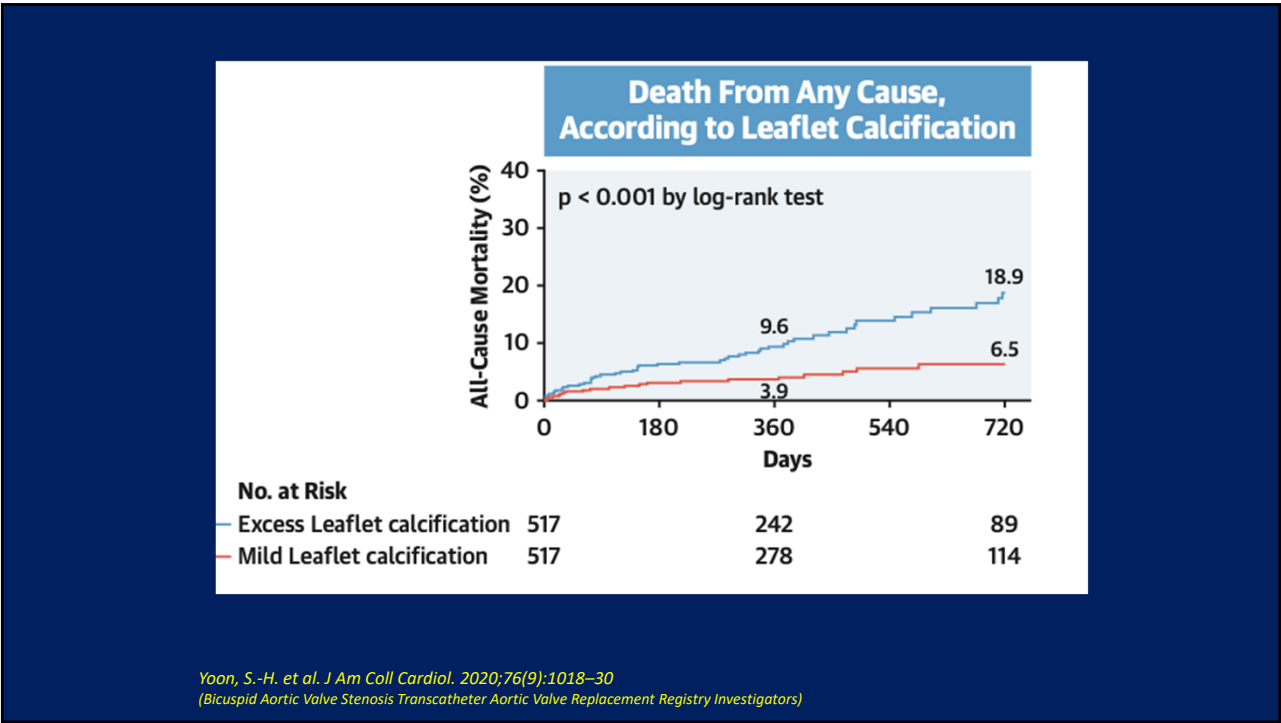
Bicuspid



Dense calcium middle of leaflet

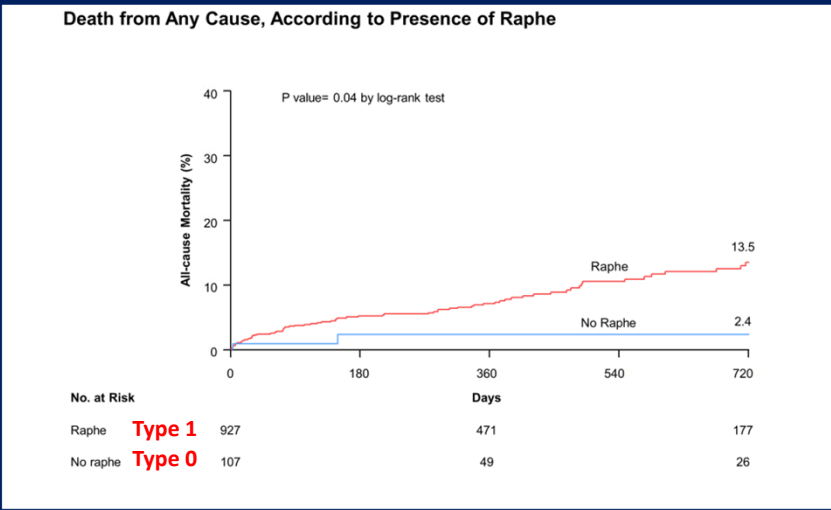
Coronary Obstruction
Aortic Root Injury
CVA

11



12

3. The Raphe



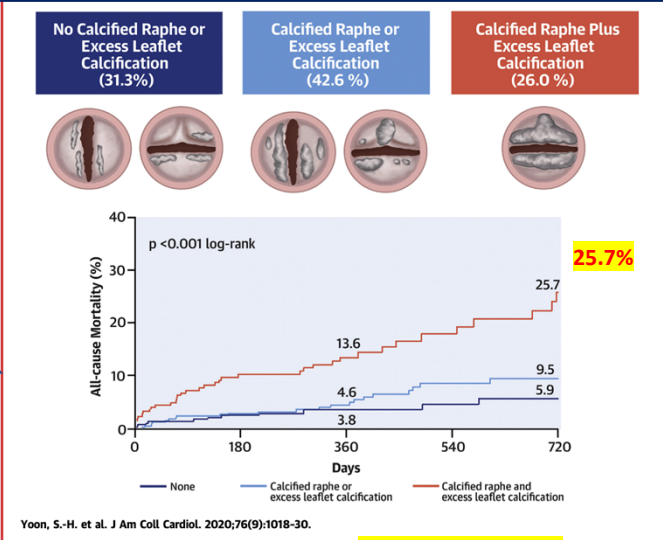
Yoon, S.-H. et al. *J Am Coll Cardiol.* 2020;76(9):1018–30
(Bicuspid Aortic Valve Stenosis Transcatheter Aortic Valve Replacement Registry Investigators)

13

3. The Raphe

*Bulky or linear calcification
>half the raphe
**Leaflet calcification volume
>382mm³

New PPI (15%)
Aortic Root Injury x 3 times risk
PVL
Conversion to surgery

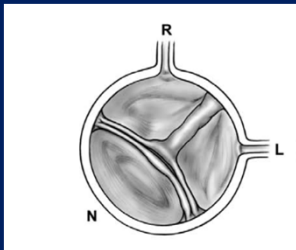


Yoon, S.-H. et al. *J Am Coll Cardiol.* 2020;76(9):1018–30
(Bicuspid Aortic Valve Stenosis Transcatheter Aortic Valve Replacement Registry Investigators)

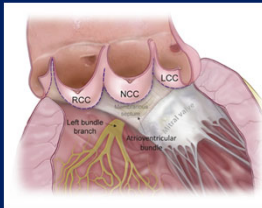
Low Risk Trials: 4.5%
Intermediate Risk Trials: 16.7%

14

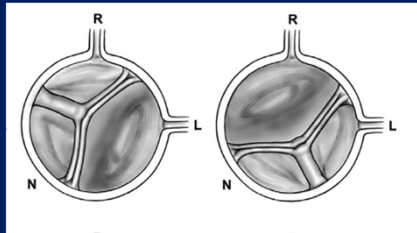
3. The Raphe



Type 1 (LR fusion): Increase PPM risk
(increase compression of the contralateral
frame with the Bundle of His under the NCC)

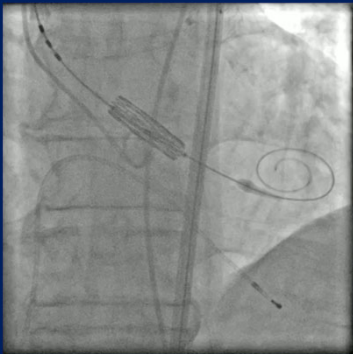


Type 1 with LN or RN fusion: increased risk
of coronary obstruction (Long leaflets and
calcified tips+)



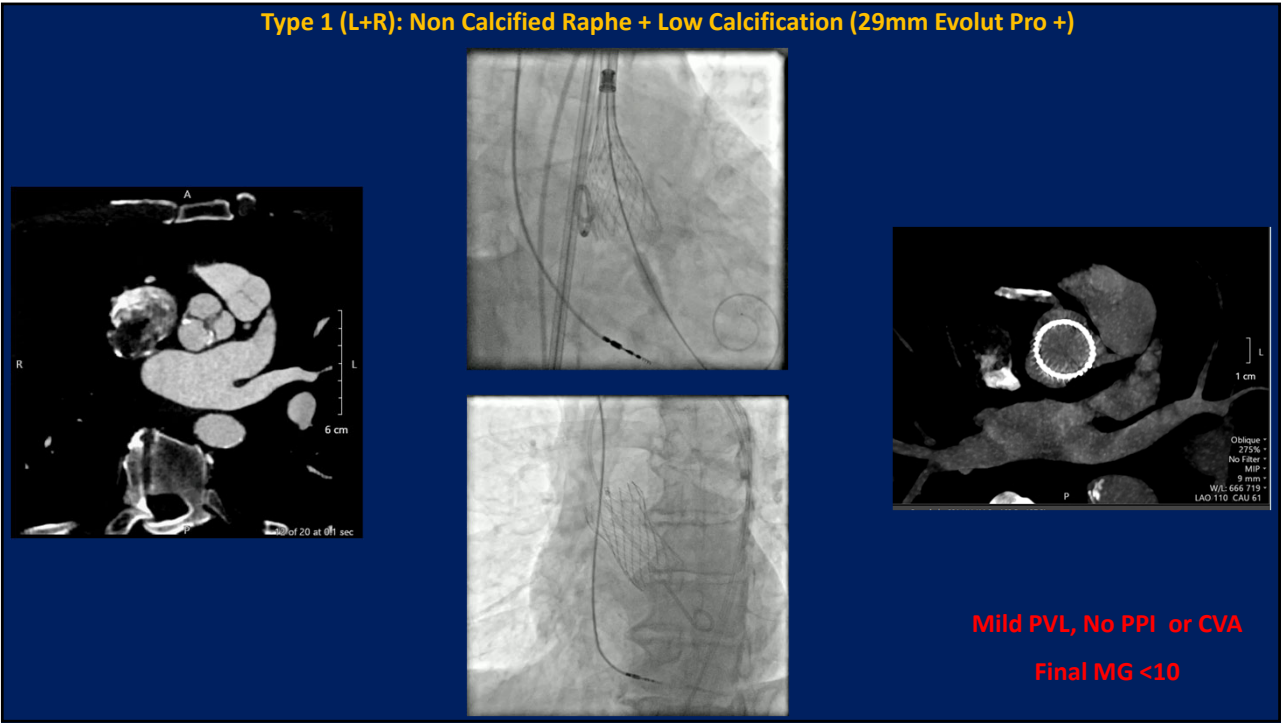
15

Type 1 (L+R): Calcified Raphe + Bulky Calcification (29mm S3 Ultra, ~2% undersizing)

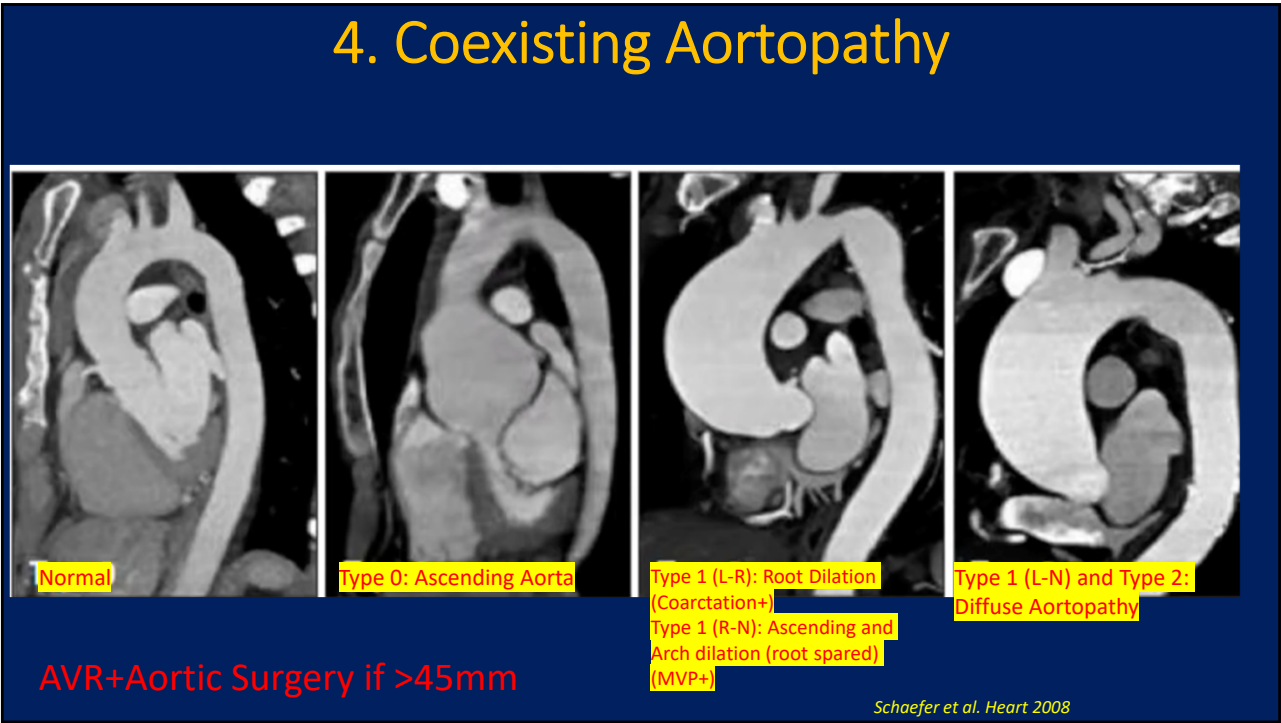


No PVL, PPI or CVA
Final MG <10

16



17

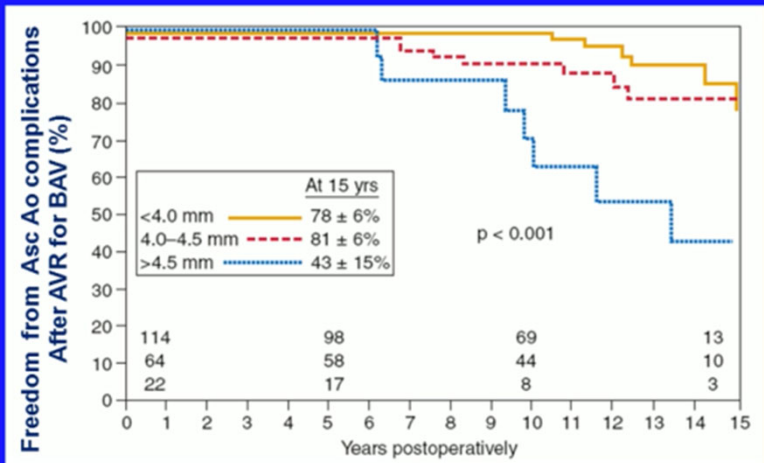


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4. Coexisting Aortopathy

2% annual risk of
dissection

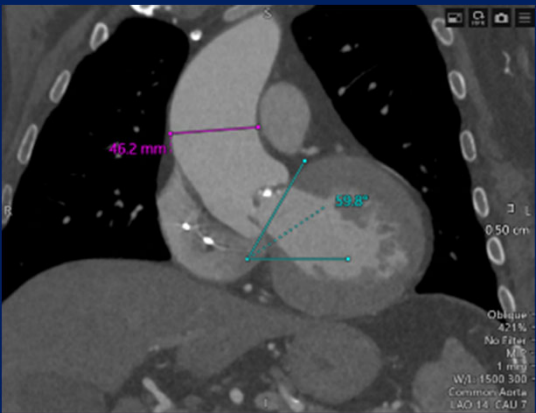
Aorta disease
progression may
occur independent of
AVR (weak data)



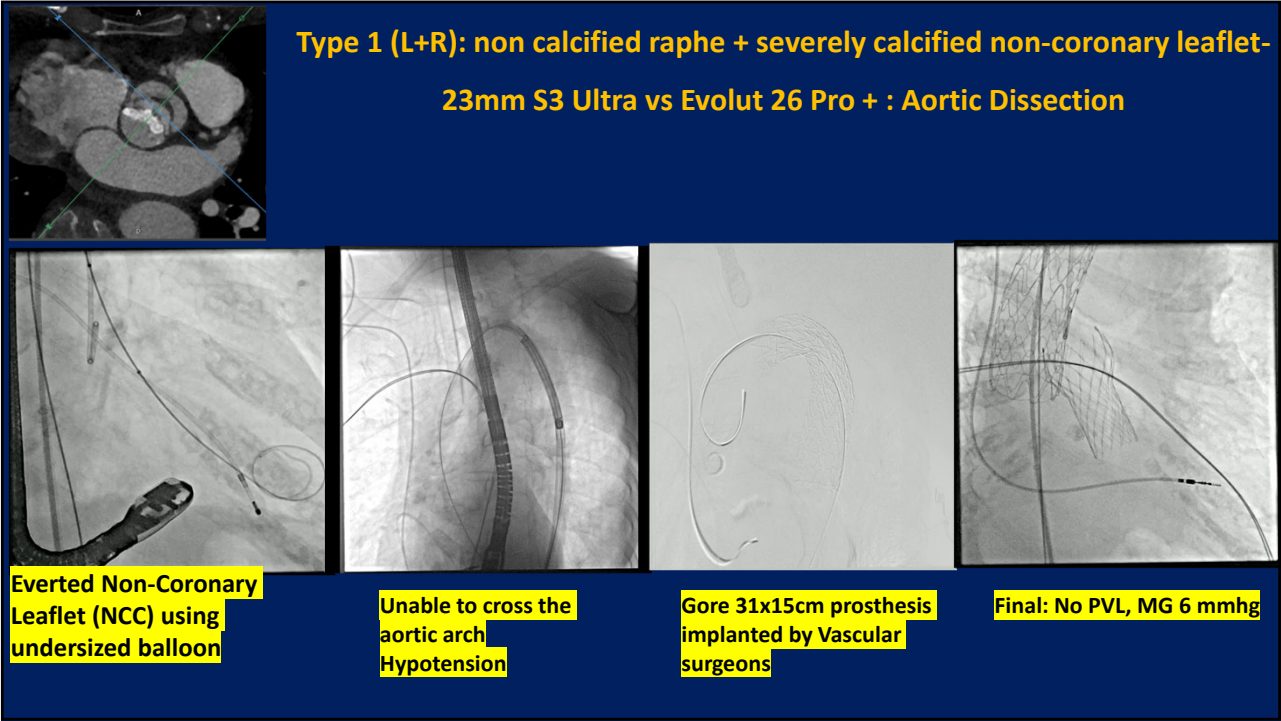
Borger MA et al. JTCV 2004

19

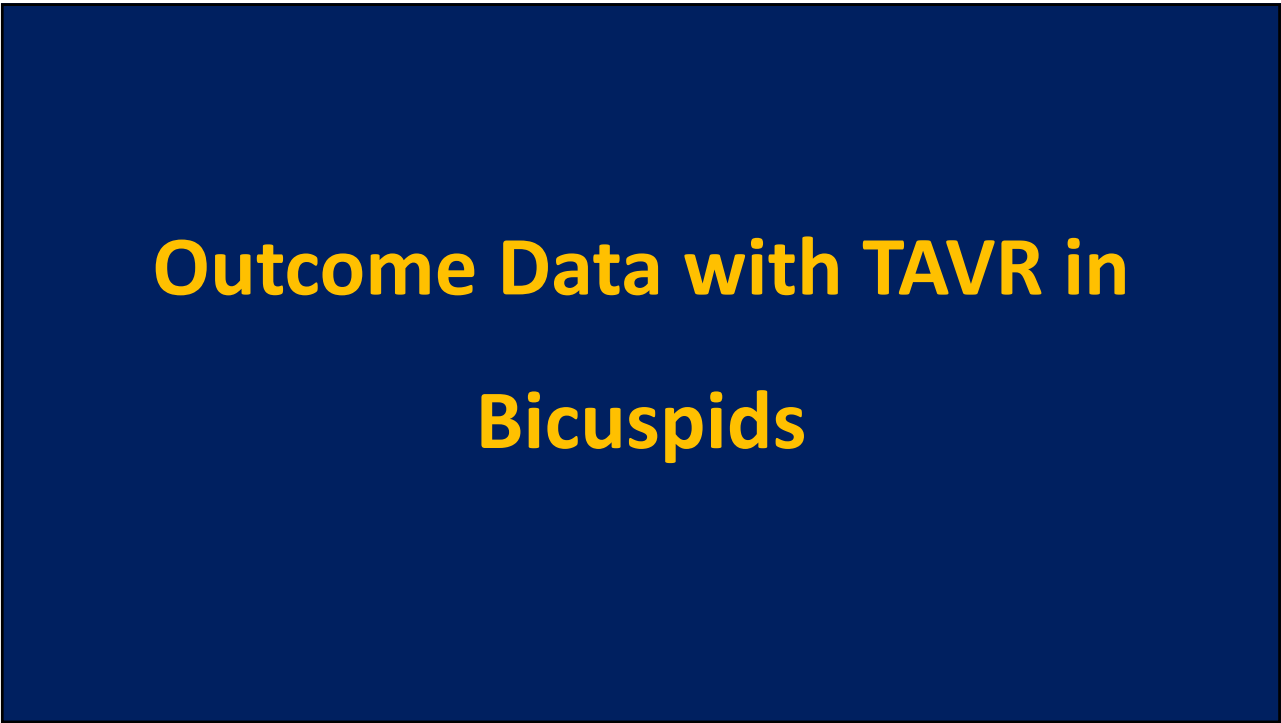
Young Male Type 1 (L+R) + Dilated Ascending Aorta- AVR and Ascending Aortic Replacement



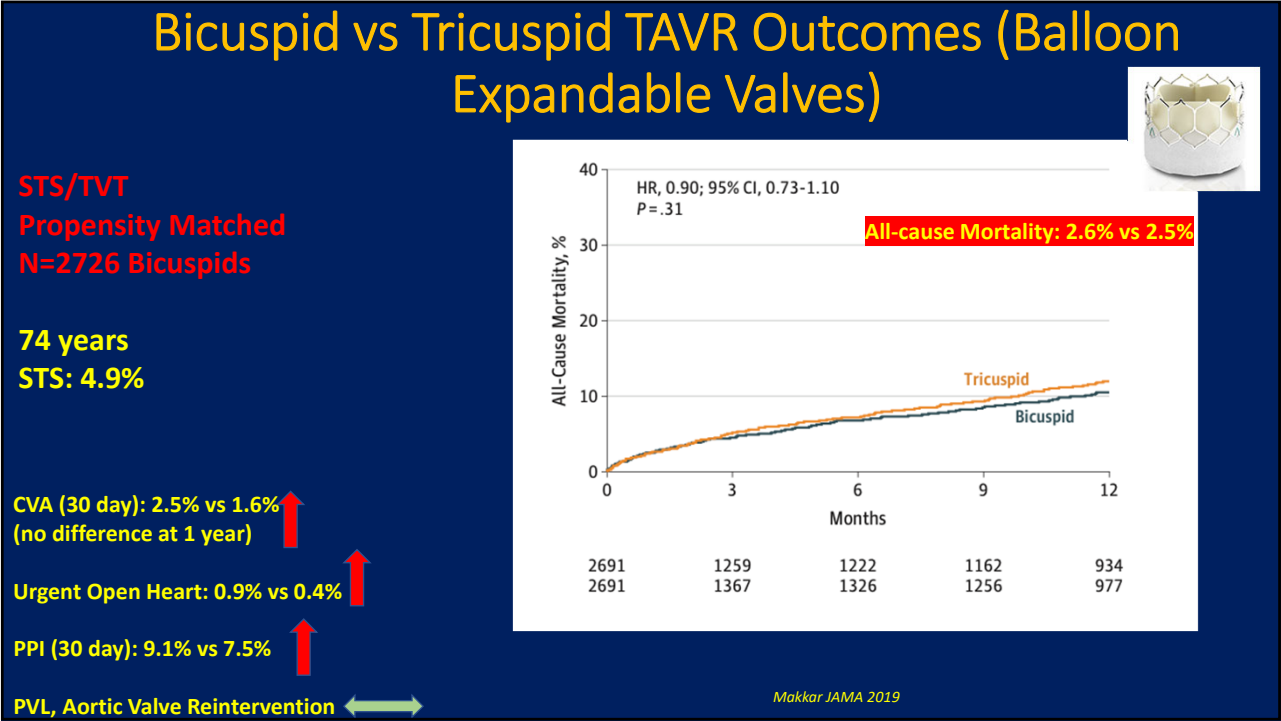
20



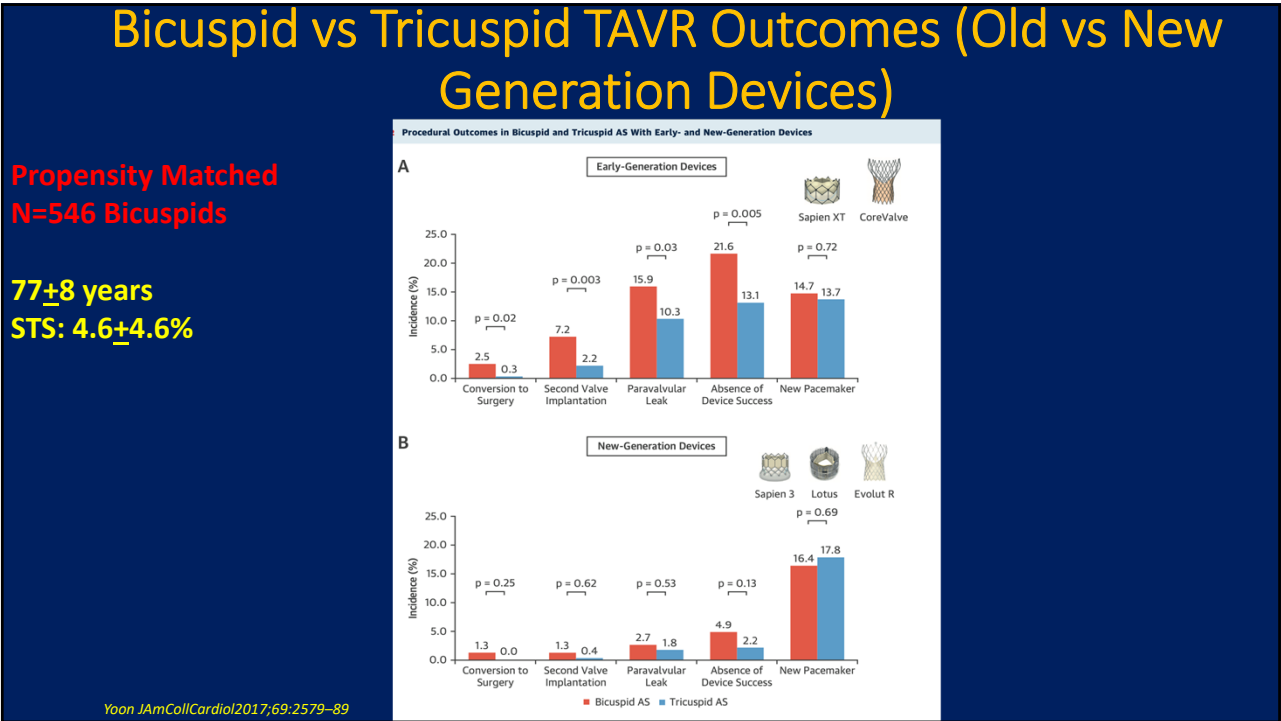
21



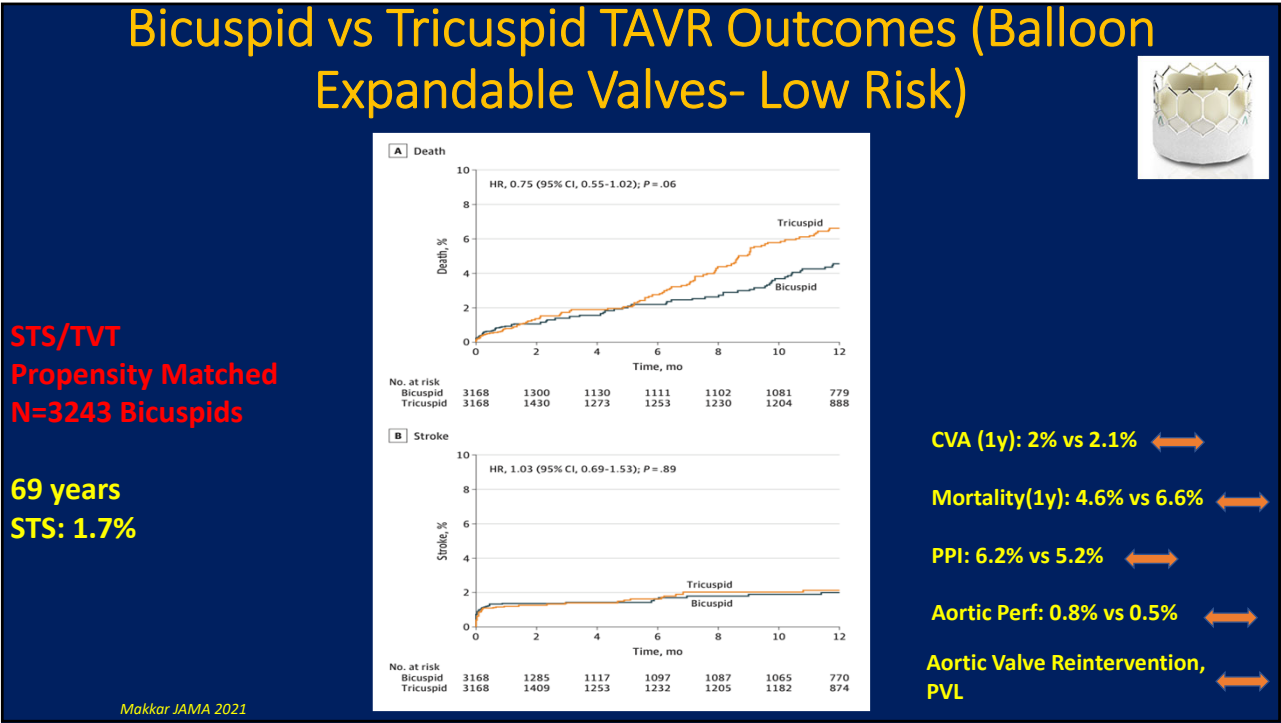
22



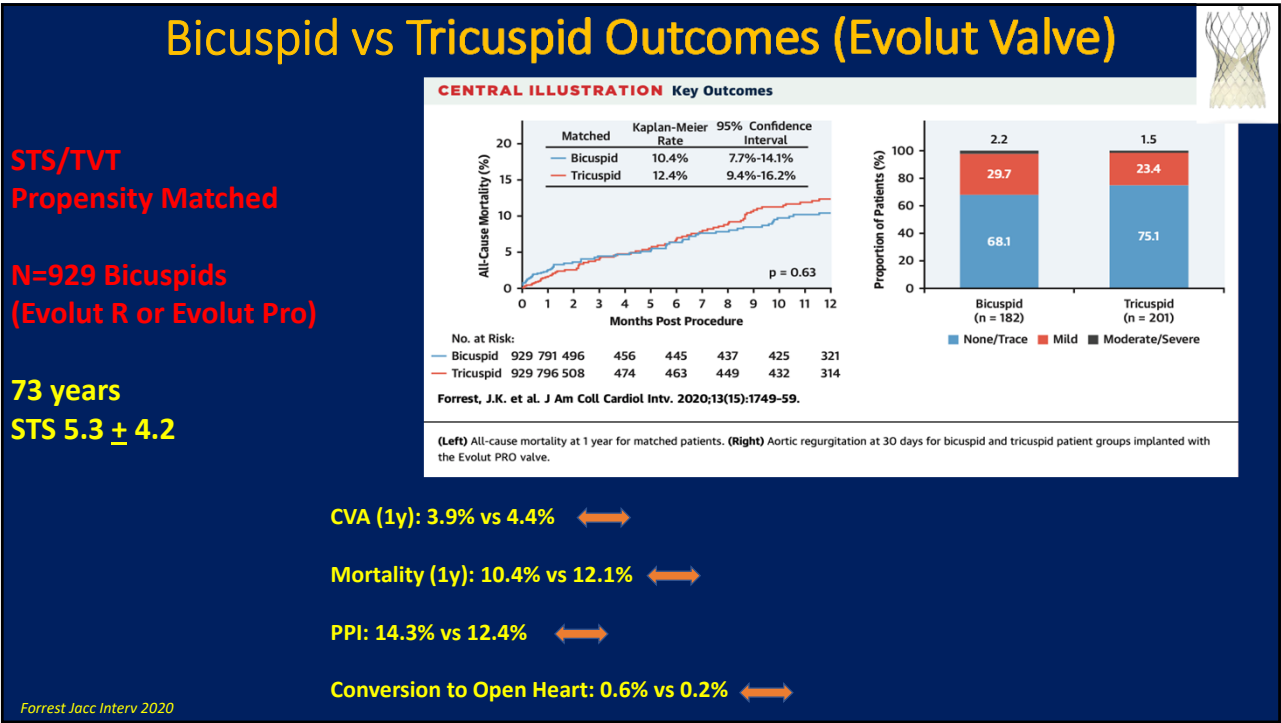
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2022

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Bicuspid vs Tricuspid Outcomes (Evolut Low Risk Bicuspid Study and Evolut Low risk Trial)

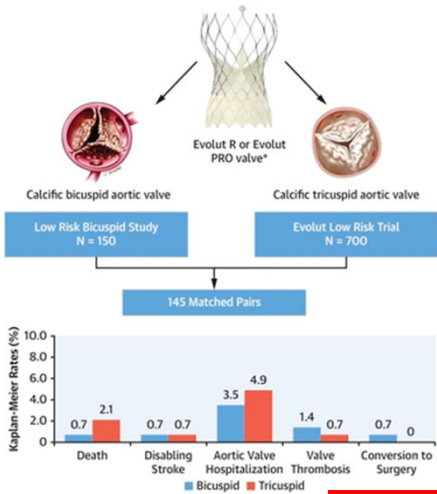


Propensity Match

150 Bicuspids (low risk bicuspid study)
vs
150 Tricuspids (Evolut low risk trial)

72 years
STS: 2 %

CENTRAL ILLUSTRATION: Self-Expanding Transcatheter Aortic Valve Replacement in Patients With Bicuspid and Tricuspid Aortic Valve Stenosis

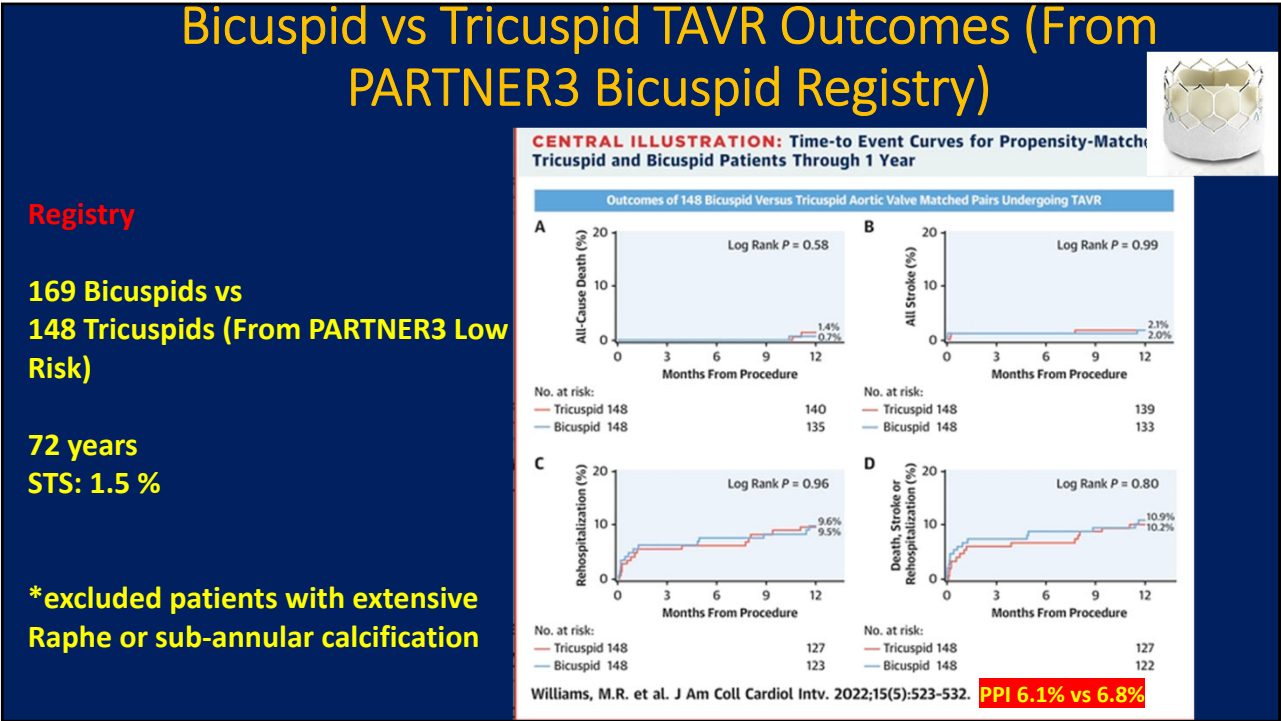


Deeb, G.M. et al. J Am Coll Cardiol Interv. 2022;15(5):511-522.

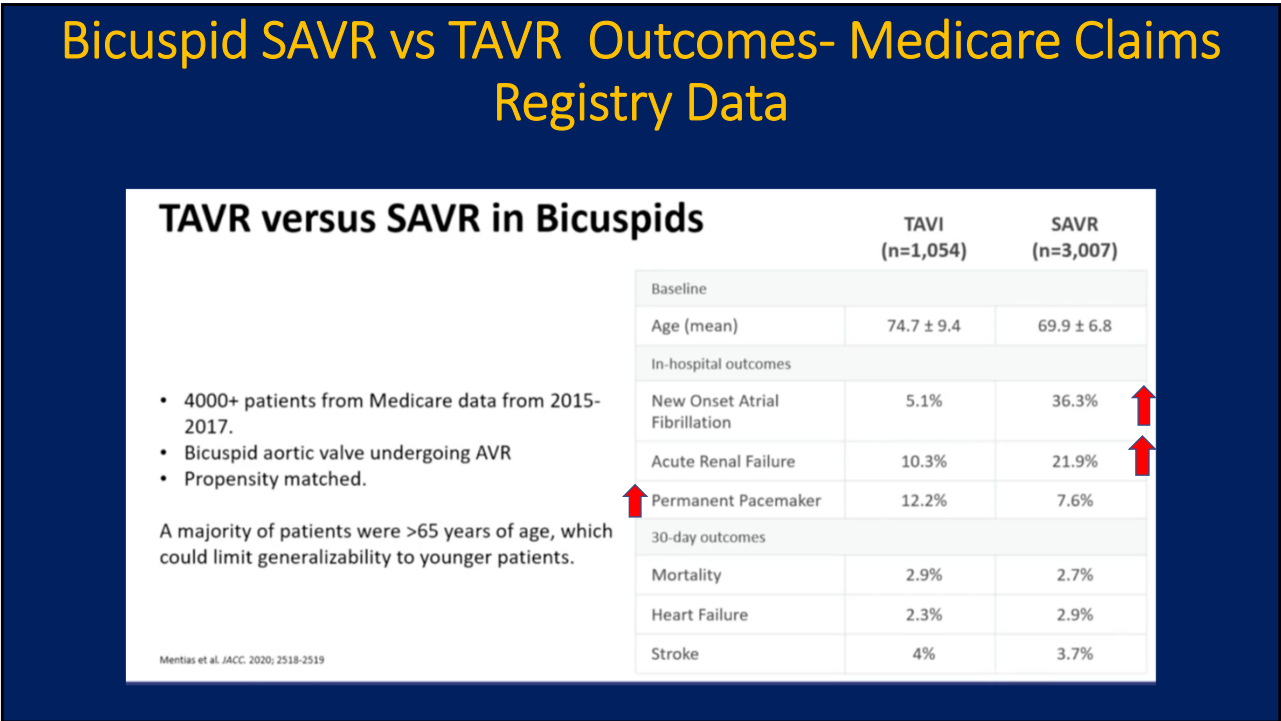
PPI 17.9% vs 16.6%

Deeb G et al JACC Interv 2022

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TAVR for Bicuspid Type 0 vs Type 1

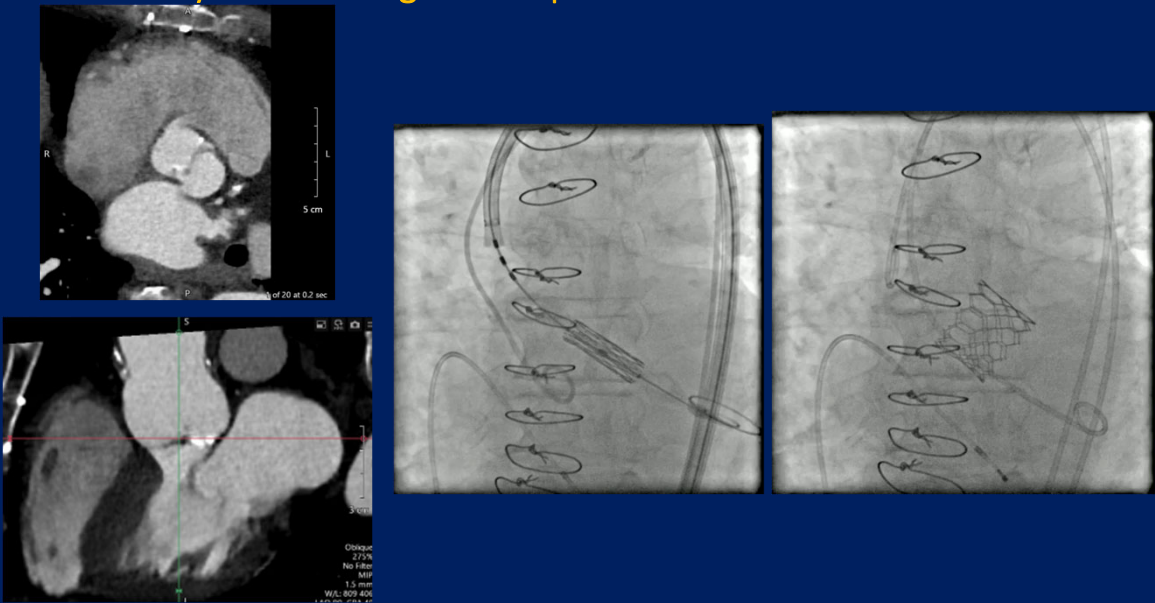
Limited Observational Data

Type 0- increased risk of coronary obstruction and elevated mean gradients post implant

Yu Du et al. Transcatheter Aortic Valve Implantation in Sievers Type 0 vs. Type 1 Bicuspid Aortic Valve Morphology: Systematic Review and Meta-Analysis. Frontiers in Cardiovascular Medicine 2021

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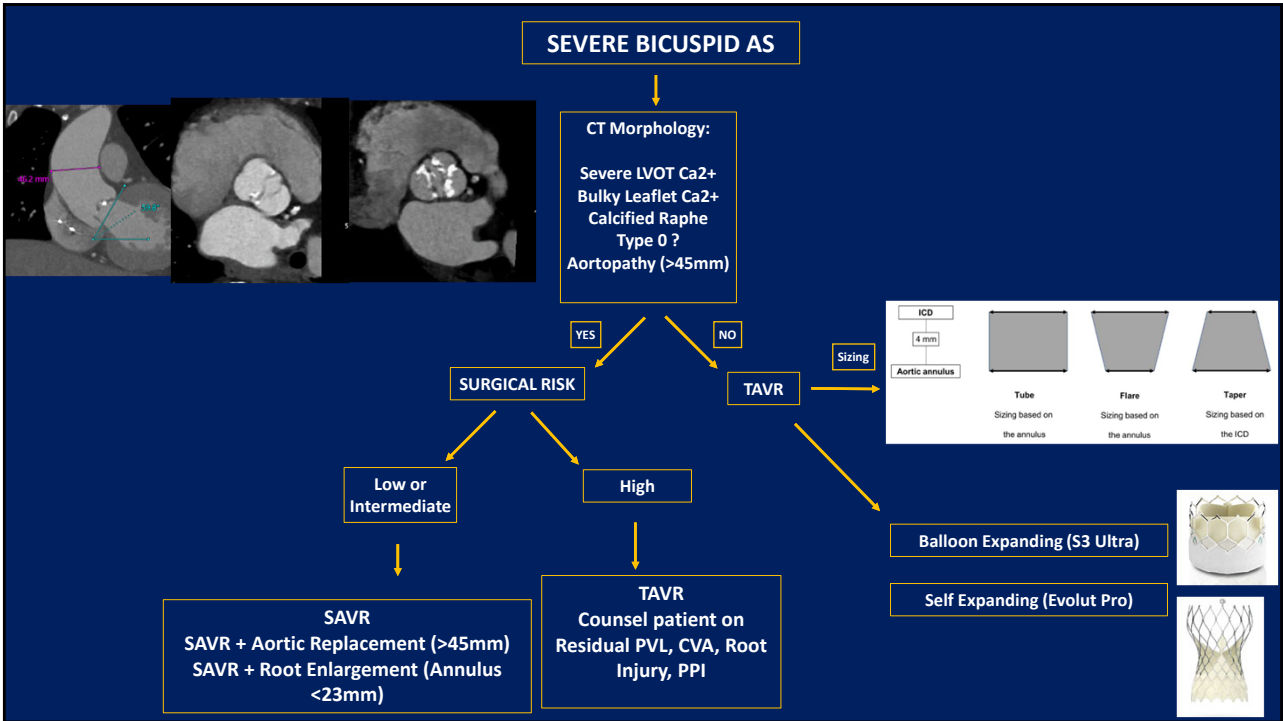
Type 0 (mixed cusps fused), non calcified raphe, low calcification burden, history of ascending aorta replacement: 26mm S3 Ultra



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Putting It All Together

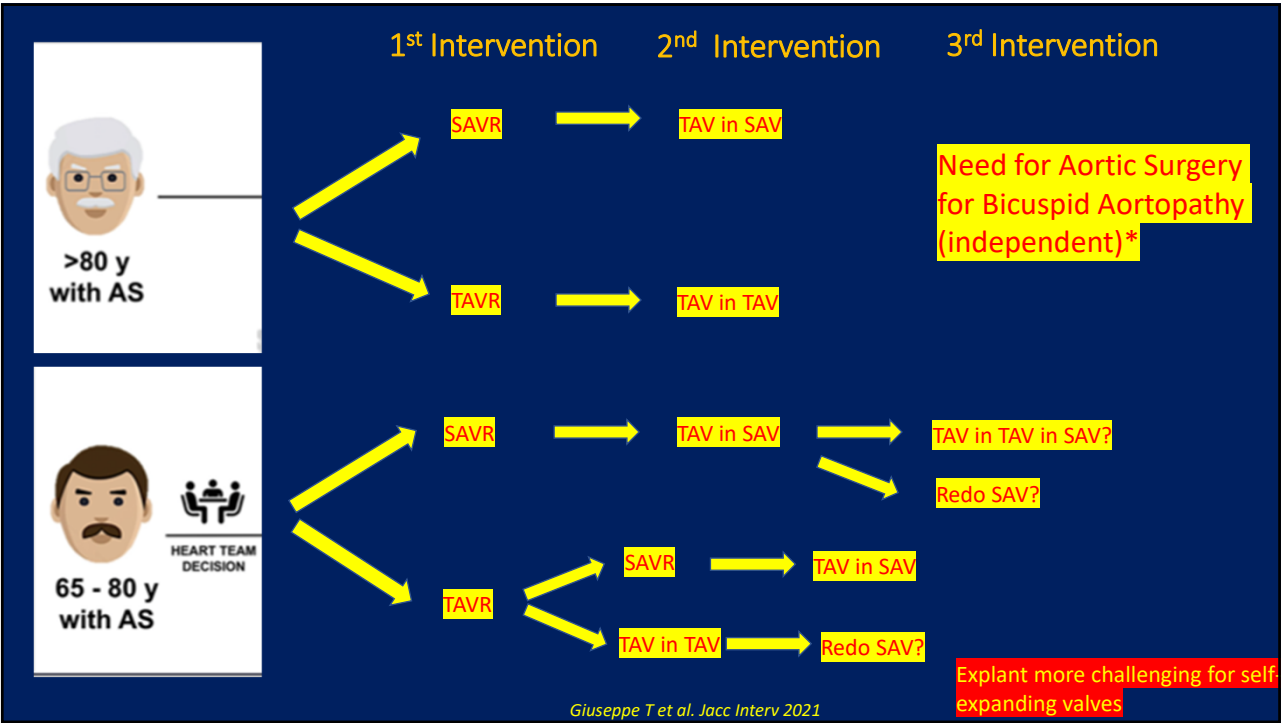
33



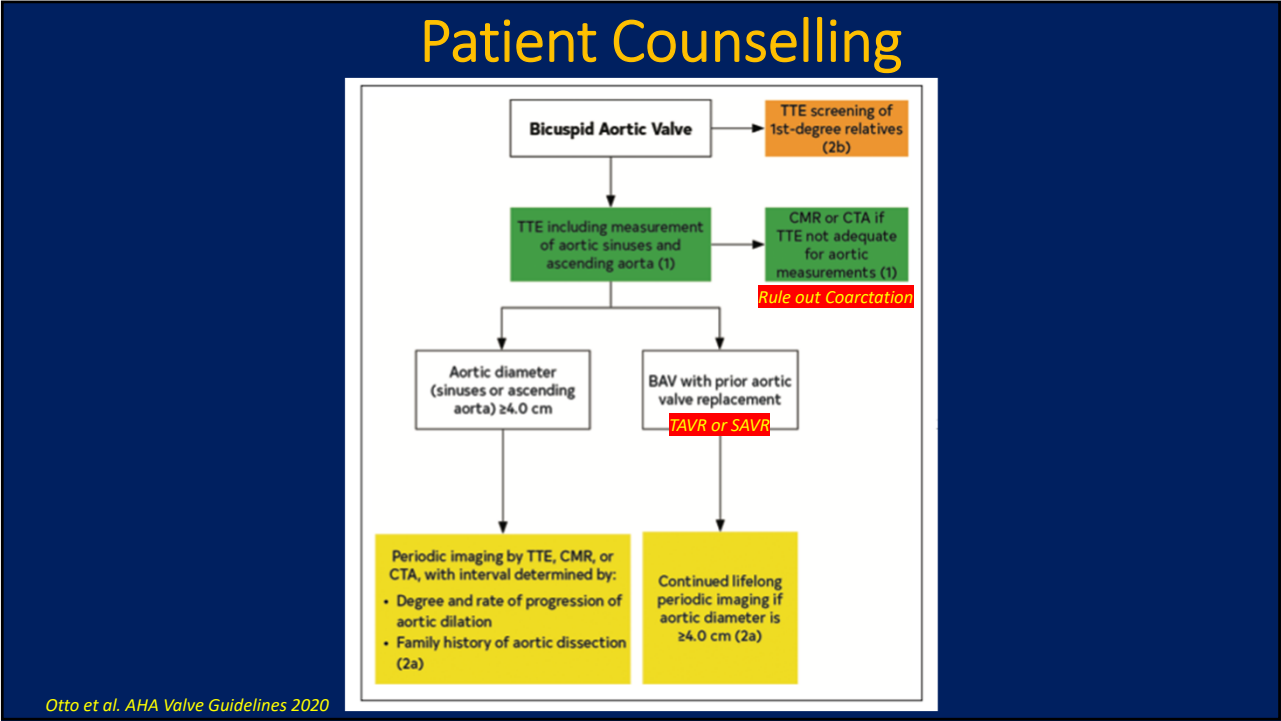
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Life Time Plan

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THANK YOU

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