Long-term outcomes of TAVR in bicuspid aortic valves based on morphology

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Nature of Financial Relationship	Ineligible Company
Grant/Research Support	Edwards Lifesciences, Abbott, Valcare
Consultant Fees/Honoraria	Edwards Lifesciences, Abbott, Gore

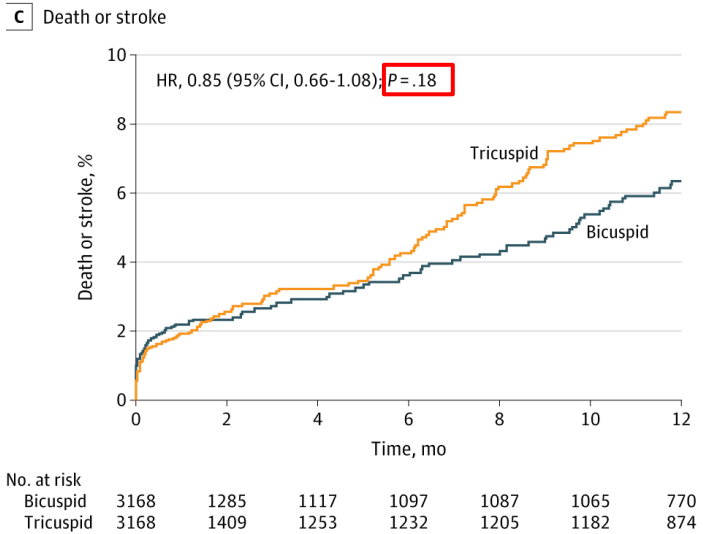
All relevant financial relationships have been mitigated.
Faculty disclosure information can be found on the app

Background

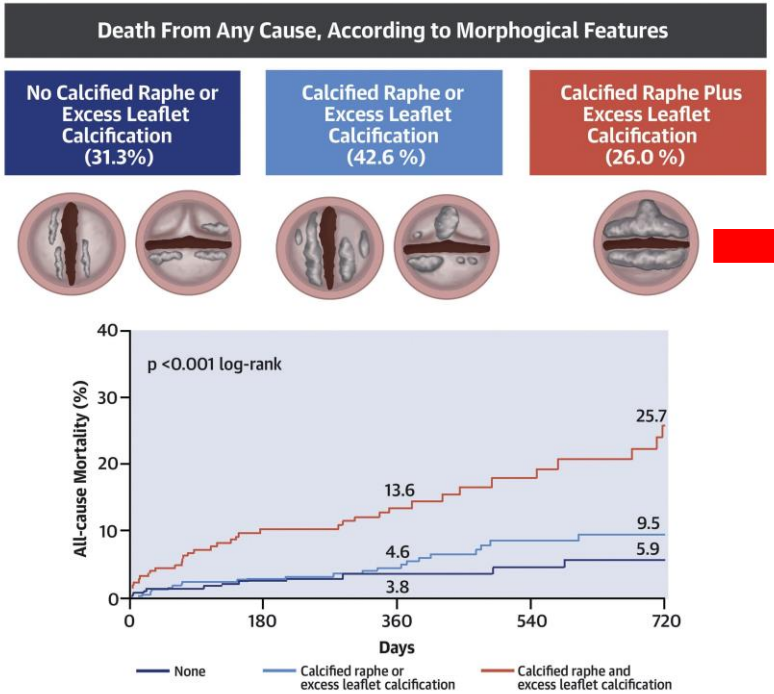
- With indications expanding to lower-risk patients, TAVR is increasingly being performed for bicuspid aortic stenosis.
- Bicuspid aortic stenosis represents a heterogeneous phenotype, depending on the presence of raphe, distribution of calcification, and presence of aortopathy.
- 5-10% of TAVRs are being performed in BAV worldwide based on different registries (7% in STS/TVT registry)

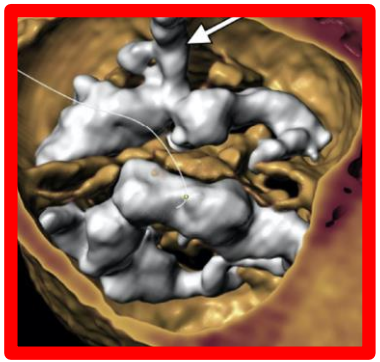
TAVR with Balloon-Expandable Valve

Characteristic % or mean ± SD	Bicuspid AS (n=2691)	Tricuspid AS (n=2691)	p-value
Device success	96.5	96.6	0.87
Conversion to open surgery	**0.9**	**0.4**	**0.03**
Annulus Rupture	**0.3**	**0.0**	**0.02**
Cardiopulmonary bypass	1.4	1.0	0.13
Aortic dissection	0.3	0.1	0.34
Coronary Obstruction	0.4	0.3	0.34
Need for a second valve	**0.4**	**0.2**	**0.16**



Mid-Term Outcomes of TAVR based on Morphology

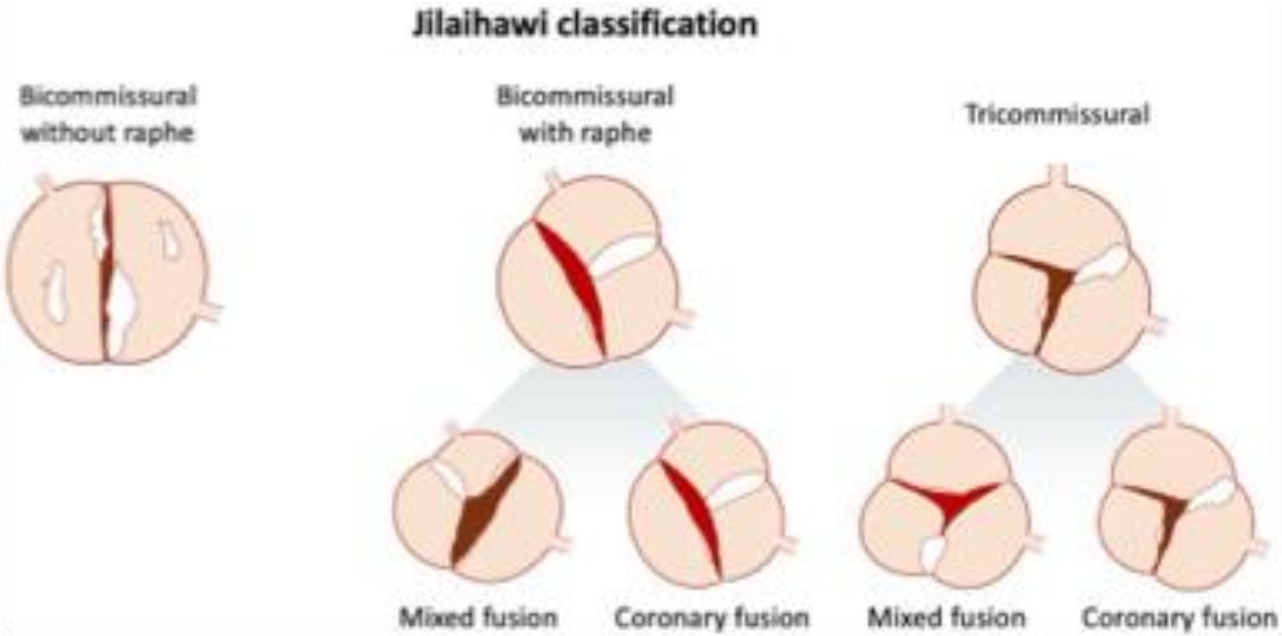




Background

- Long-term outcomes of TAVR in patients with bicuspid aortic valve (BAV) are unknown.
- In the present study, we examined long-term mortality in these patients based on BAV morphology relevant to TAVR.
  - A novel TAVR-directed and simplified non-numerical classification based on heterogeneous leaflet morphologies and on leaflet orientation

BAV Classification based on Morphology



Methods

- **274** consecutive patients with BAV who underwent TAVR at a single institution between 2014 – 2024, comparing survival by BAV morphology using Kaplan-Meier curves and the log-rank test.
- Cox regression adjusted for sex, age, BMI, STS score, and aortic valve calcification (AVC) was performed to assess predictors of survival.

BAV Morphology

Tricommissural

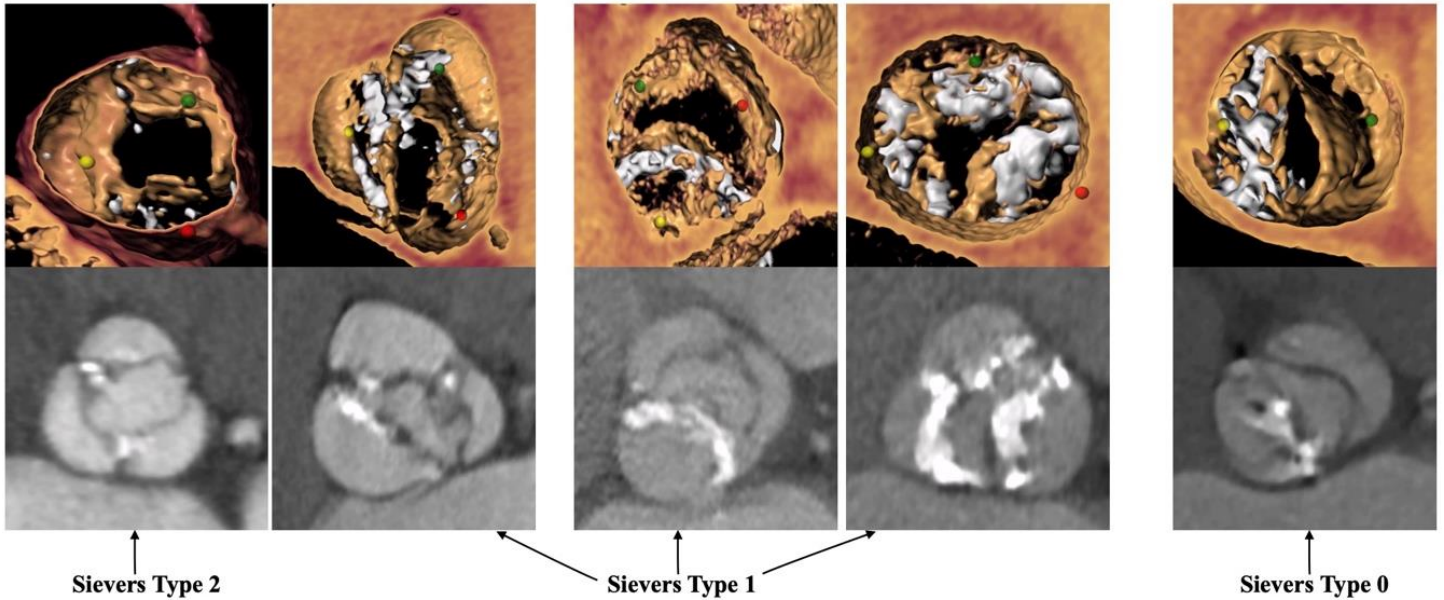
60/295 (20.3%)

Bicommissural RapheType

195/295 (66%)

Bicommissural Non RapheType

40/295 (13.5%)



Sievers Type 2

Sievers Type 1

Sievers Type 0

Baseline Characteristics

	All n = 295	Bicommissural, no raphe n = 40	Bicommissural, with raphe n = 195	Tricommissural, with raphe n = 60
Female	129 (44%)	20 (50%)	80 (41%)	29 (48.3%)
Age (in yrs)	72.5 (±9.2)	67.4 (± 10)	72.4 (± 8.7)	76.0 (±8.8)
STS	3.8 (±3.7)	3.8 (±3.7)	4.5 (±4.3)	4.7 (±4.5)
Aortic Valve Ca score	3236 (±2198)	3048 (±2161)	3479 (±2319)	2575 (±1627)
NYHA Class III-IV	232 (78.6%)	31 (77.5%)	155 (79.5%)	46 (76.7%)

Baseline Characteristics

	All n = 295	Bicommissural, no raphe n = 40	Bicommissural, with raphe n = 195	Tricommissural, with raphe n = 60
BMI	29.0 (± 6.4)	29.9 (±7.3)	28.7 (±6.4)	29.1 (±5.9)
eGFR	67.6 (±21.4)	74.4 (±17.2)	69.1 (±20.9)	59 (±23.3)
DM	88 (29.8%)	11 (27.5%)	51 (26.2%)	26 (43.3%)
HTN	246 (83.3%)	30 (75%)	164 (84.1%)	52 (86.7%)
HLP	175 (59.3%)	24 (60%)	116 (59.5%)	35 (59.3%)

Baseline Characteristics

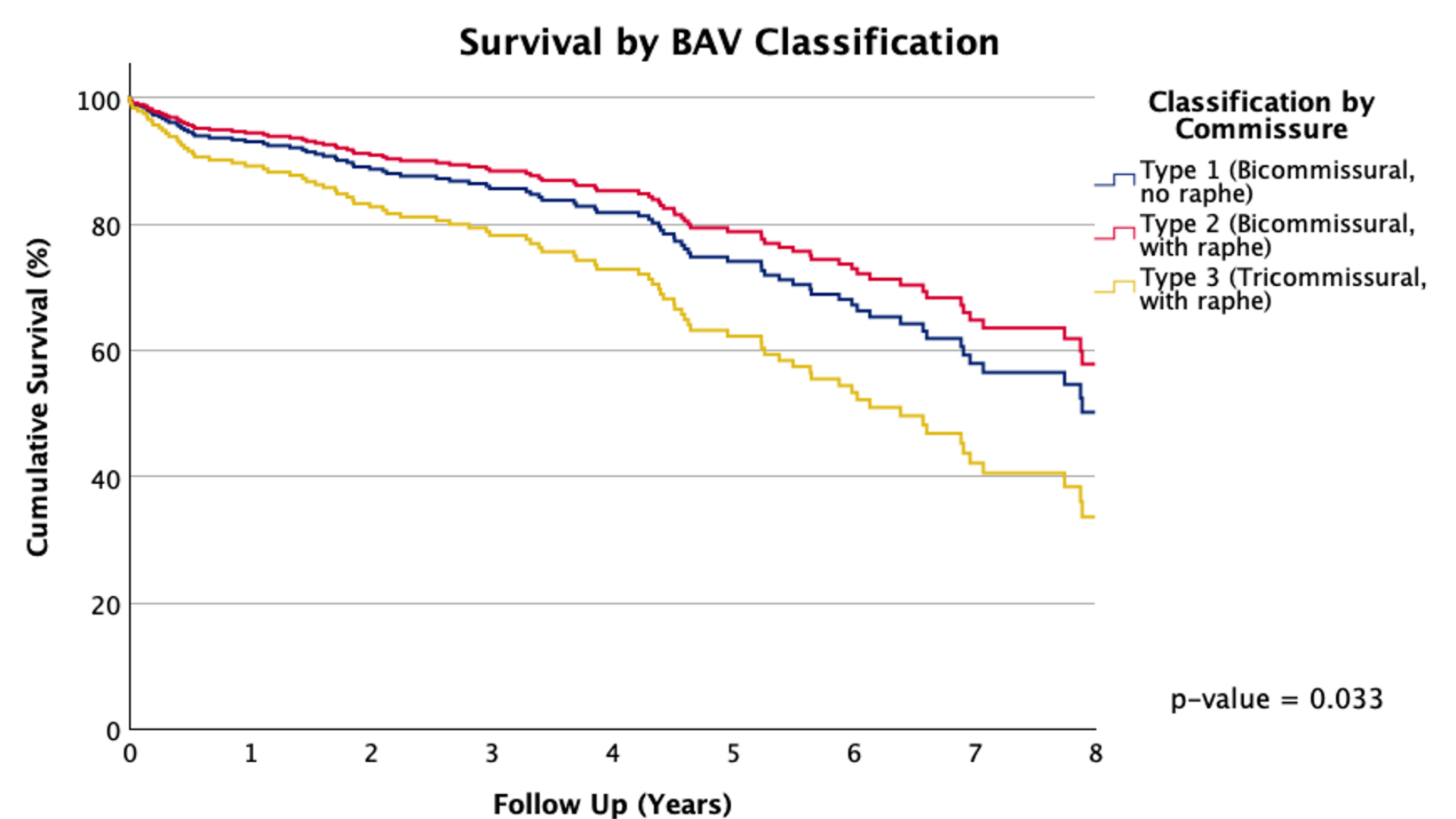
	All n = 295	Bicommissural, no raphe n = 40	Bicommissural, with raphe n = 195	Tricommissural, with raphe n = 60
CAD	139 (47.1%)	13 (32.5%)	96 (49.2%)	30 (50%)
PAD	44 (14.9%)	4 (10%)	31 (15.9%)	9 (15.0%)
Pulm disease (mod-severe)	28 (9.6%)	2 (5%)	22 (11.5%)	4 (6.8%)
Afib	73 (24.7%)	6 (15%)	52 (26.7%)	15 (25.0%)
Prior PPM	19 (6.4%)	3 (7.5%)	10 (5.1%)	6 (10%)

Outcomes Based on BAV Morphology

	All n = 295	Bicommissural, no raphe n = 40	Bicommissural, with raphe n = 195	Tricommissural, with raphe n = 60
MACE (1 yr)	34 (11.5%)	4 (10%)	21 (10.8%)	9 (15%)
Stroke (1 yr)	10 (3.3%)	1 (2.5%)	6 (3%)	3 (5%)
Death (median, 8.63 yrs)	90 (30.5%)	9 (22.5%)	56 (28%)	25 (41.7)

Independent Predictors of Long-term Mortality

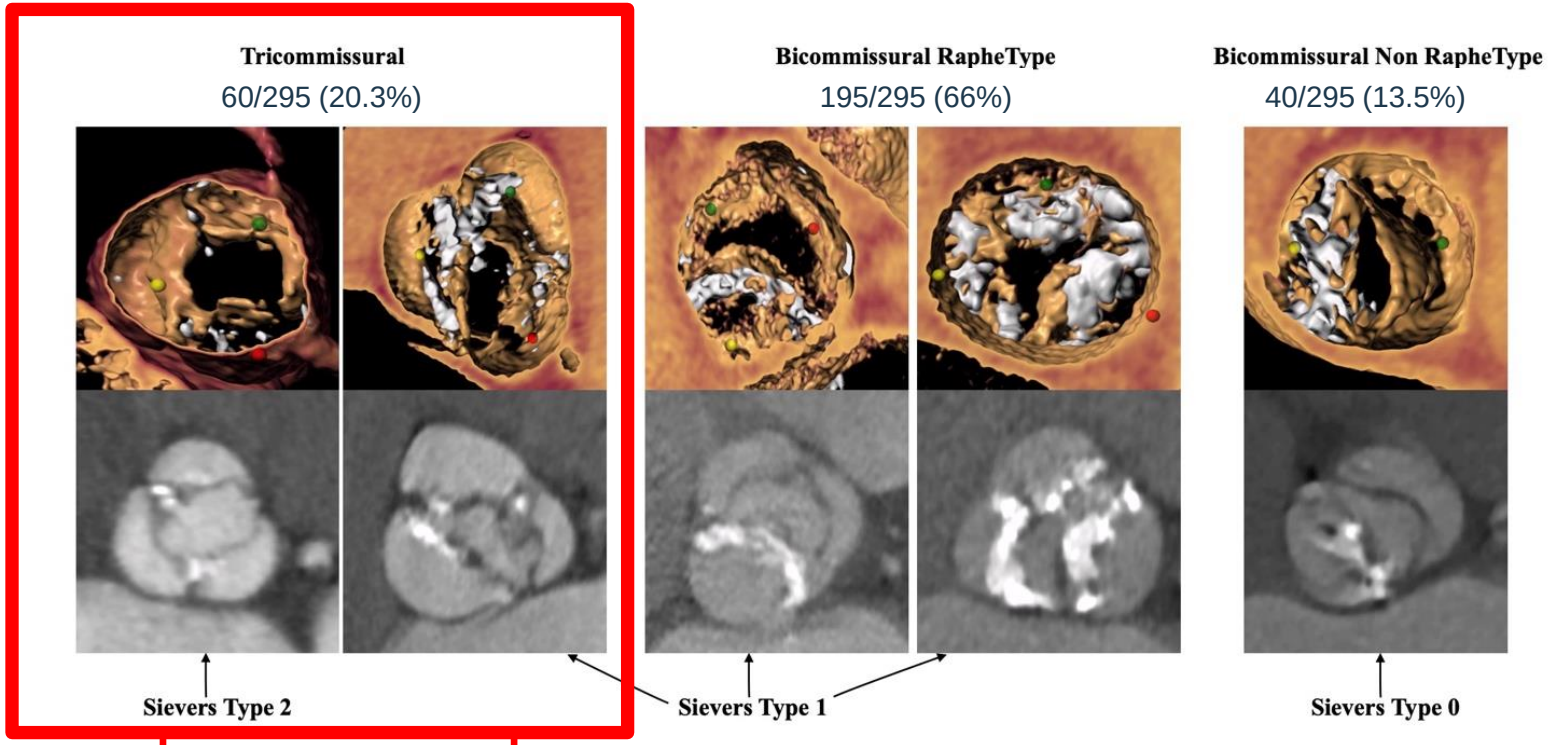
	Hazard Ratio (95% CI)	P-value
Age (years)	1.02	0.23
Female sex	0.71	0.15
BMI (kg/m^2)	0.99	0.71
STS score	1.14	<0.001
Aortic valve calcium score	1	0.27
Commissure classification (overall)		0.033


Survival by BAV Classification
Cumulative Survival (%)
100
80
60
40
20
0
0
1
2
3
4
5
6
7
8
Follow Up (Years)
Classification by Commissure
Type 1 (Bicommissural, no raphe)
Type 2 (Bicommissural, with raphe)
Type 3 (Tricommissural, with raphe)
p-value = 0.033

Results

- Long-term survival (median 8.67 yrs) after TAVR differs significantly based on BAV morphology amongst the three groups (log-rank p = 0.007).
- Patients with bicommissural raphe morphology demonstrated the highest survival, followed by bicommissural non-raphe and tricommissural types.
- In multivariable Cox regression, BAV morphology remained an independent predictor of survival (overall p = 0.004) after adjusting for age, sex, BMI, STS score, and AVC.

BAV Morphology



42% Mortality

Conclusion

The type of BAV is a major determinant of long-term prognosis in patients undergoing TAVR and should be strongly considered in the decision-making.

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