Characterizing the Role of Bicuspid Aortic Valves on Proximal Aortic Surgery

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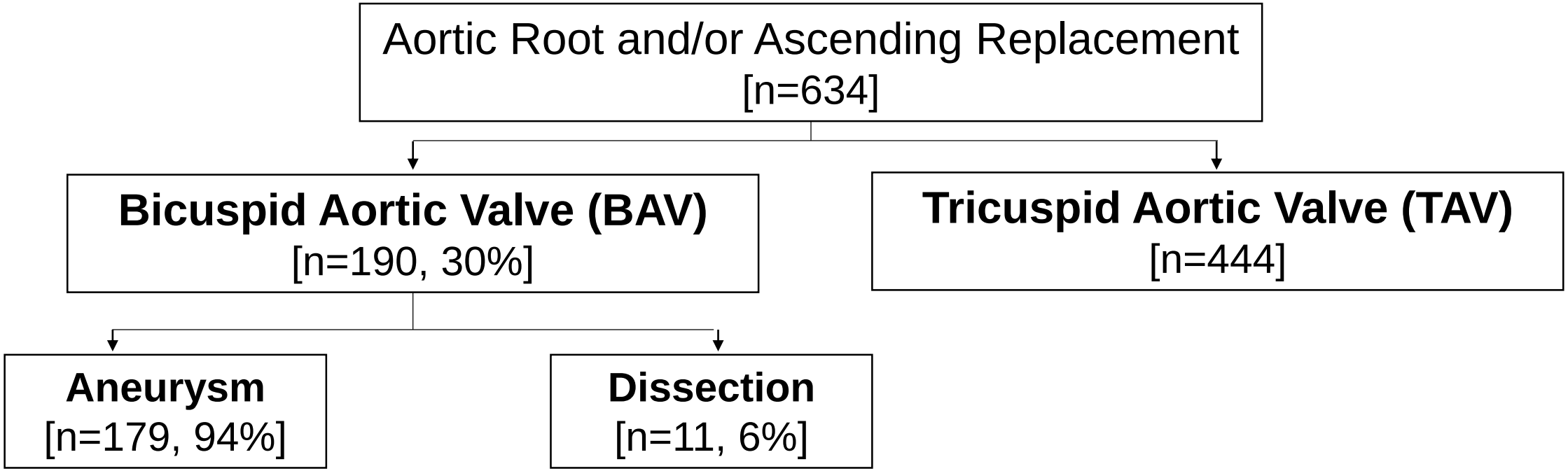
Background

- Bicuspid aortic valve (BAV) occurs in 1-2% of the population
- BAV has been associated with aortopathy in addition to valve pathology
- Guidelines have waivered over the years in regard to thresholds for surgical intervention for patients with BAV over the years

Study Design



Study Population

	Total (n=634)	BAV (n=190)	TAV (n=444)	p-value
Age	**59 (49, 67)**	**56 (44, 63)**	**61 (51, 69)**	**<0.0001**
Sex, male	**458 (72)**	**151 (79)**	**307 (69)**	**0.008**
BSA	2.1 (1.9, 2.3)	2.1 (1.9, 2.3)	2.0 (1.9, 2.3)	0.26
Diabetes	84 (13)	62 (14)	22 (12)	0.42
Hypertension	**540 (85)**	**138 (73)**	**402 (91)**	**<0.0001**
Dyslipidemia	344 (58)	104 (57)	240 (59)	0.70
Renal Failure on Dialysis	13 (2.1)	1 (0.5)	12 (2.7)	0.12
Stroke	**60 (9.5)**	**8 (4.2)**	**52 (12)**	**0.003**
Myocardial Infarction	**75 (12)**	**15 (7.9)**	**60 (14)**	**0.045**
LVEF	57 (50, 60)	58 (53, 61)	55 (50, 60)	0.11
Moderate-to-Severe Aortic Stenosis	**67 (12)**	**46 (25)**	**21 (5.3)**	**<0.0001**
Moderate-to-Severe Aortic Insufficiency	260 (44)	85 (46)	95 (43)	0.55
Connective Tissue Disease	**27 (6.0)**	**2 (1.4)**	**25 (8.2)**	**0.004**
Previous Cardiac Surgery	**160 (26)**	**32 (17)**	**128 (30)**	**0.0006**
Prior Valve	**76 (13)**	**13 (7.3)**	**63 (15)**	**0.007**
Aortic	**62 (11)**	**8 (4.5)**	**54 (14)**	**0.001**
Prior Root	**26 (4.5)**	**3 (1.7)**	**23 (5.8)**	**0.03**
Prior Ascending	27 (4.7)	4 (2.3)	23 (5.8)	0.06

Operative Indications

	Total (n=634)	BAV (n=190)	TAV (n=444)	p-value
Primary Indication				<0.0001
Valve Pathology	64 (12)	33 (20)	31 (8.0)	
Aortic Pathology	366 (66)	86 (51)	280 (72)	
Combined Valve/Aortic	117 (21)	49 (29)	68 (18)	
Aortic Indication				<0.0001
Aneurysm	418 (66)	**179 (94)**	**239 (54)**	
Dissection	187 (30)	**11 (5.8)**	**176 (40)**	
Other	29 (4.6)	0 (0)	29 (6.5)	
Max Thoracic Aortic Diameter (mm)	52 (47, 58)	50 (48, 54)	52 (47, 60)	0.001

Study Population – BAV Subgroup

	BAV (n=190)	Aneurysm (n=179)	Dissection (n=11)	p-value
Age	56 (44, 63)	56 (45, 63)	52 (41, 64)	0.46
Sex, male	151 (79)	140 (78)	11 (100)	0.12
BSA	2.1 (1.9, 2.3)	2.1 (1.9, 2.3)	2.2 (2.0, 2.4)	0.09
Diabetes	22 (12)	20 (11)	2 (18)	0.62
Hypertension	138 (73)	131 (73)	7 (64)	0.50
Dyslipidemia	104 (57)	101 (59)	3 (27)	0.06
Renal Failure on Dialysis	1 (0.5)	1 (0.6)	0 (0)	1.0
CVA	8 (4.2)	7 (3.9)	1 (9.1)	0.39
MI	15 (7.9)	15 (8.4)	0 (0)	1.0
Cardiogenic Shock	0 (0)	0 (0)	0 (0)	-
LVEF	**58 (53, 61)**	**58 (55, 63)**	**53 (25, 55)**	**0.002**
Moderate-to-Severe Aortic Stenosis	46 (25)	46 (27)	0 (0)	0.27
Moderate-to-Severe Aortic Insufficiency	85 (46)	7 (64)	78 (45)	0.72
Connective Tissue Disease	2 (1.4)	1 (0.7)	1 (13)	0.11
Previous Cardiac Surgery	32 (17)	30 (17)	2 (18)	1.0
Prior Aortic Valve	8 (4.5)	8 (4.8)	0 (0)	1.0
Prior Root	3 (1.7)	2 (1.2)	1 (9.1)	0.18
Prior Ascending	4 (2.3)	3 (1.8)	1 (9.1)	0.23

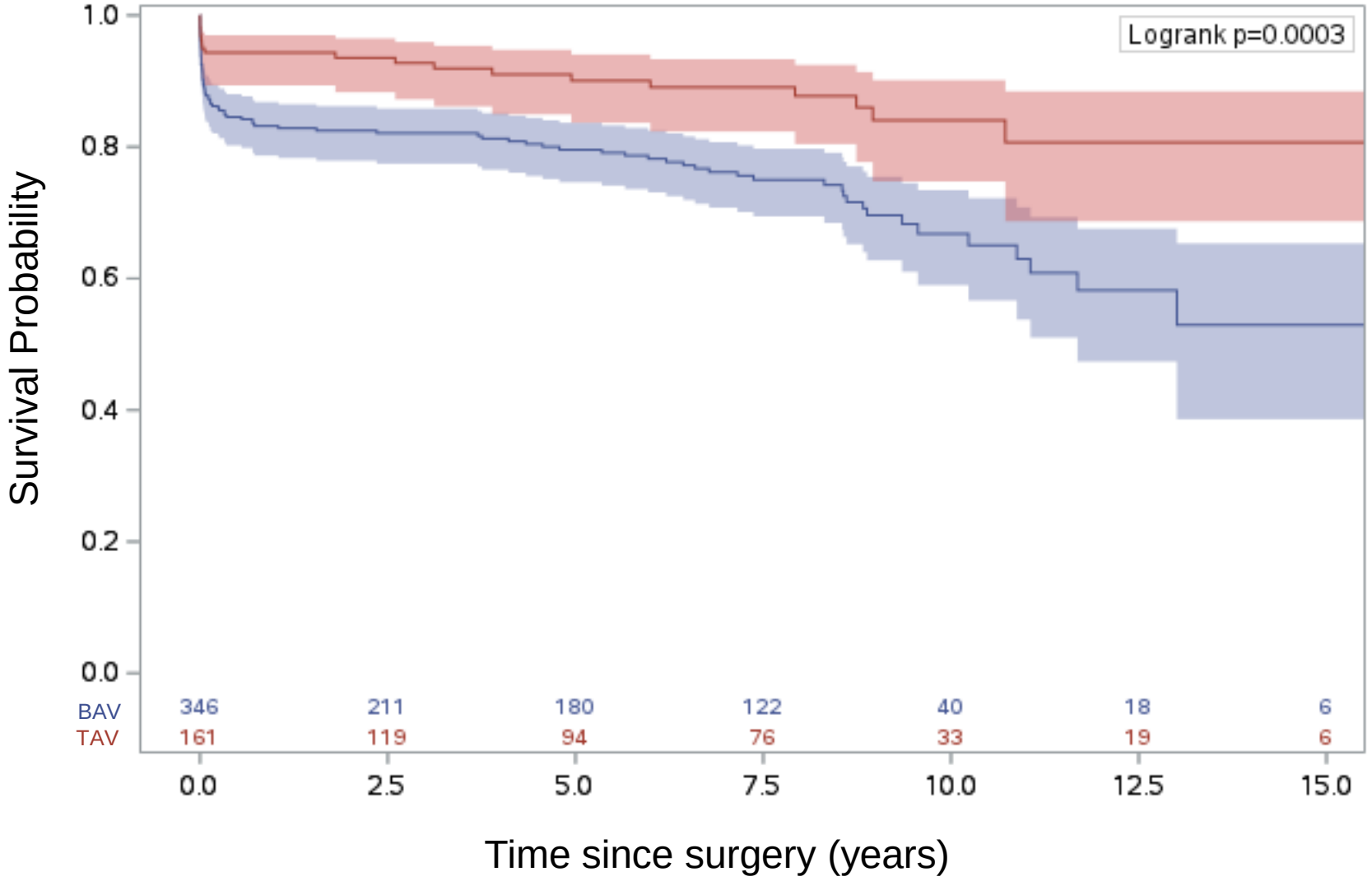
Intraoperative Data

	Total (n=634)	BAV (n=190)	TAV (n=444)	p-value
Status				**<0.0001**
Elective	**190 (30)**	**80 (42)**	**110 (25)**	
Urgent	**316 (50)**	**105 (55)**	**211 (48)**	
Emergent	**127 (20)**	**5 (2.6)**	**122 (27)**	
Emergent Salvage	**1 (0.2)**	**0 (0)**	**1 (0.2)**	
Aortic Valve Replacement	**311 (55)**	**131 (73)**	**180 (46)**	**<0.0001**
Mechanical	**85 (15)**	**43 (24)**	**42 (11)**	**<0.0001**
Bioprosthetic	**213 (38)**	**83 (46)**	**130 (33)**	**0.003**
Valve Size (mm)	27 (25, 29)	27 (25, 29)	27 (23, 29)	0.18
Aortic Root Replacement	298 (50)	99 (55)	199 (47)	0.09
VSRR	96 (15)	23 (12)	73 (16)	0.16
Bentall	**202 (32)**	**75 (39)**	**127 (29)**	**0.007**
Ascending Replacement	**434 (81)**	**142 (85)**	**292 (80)**	**0.03**
Hemiarch Replacement	267 (51)	90 (54)	177 (49)	0.30
Partial/Total Arch	**39 (7.3)**	**6 (3.6)**	**33 (9.0)**	**0.03**
CABG	109 (17)	27 (14)	82 (18)	0.19
CPB time (min)	**185 (149, 232)**	**172 (135, 210)**	**194 (156, 240)**	**<0.0001**
Cross-clamp time (min)	146 (102, 187)	136 (103, 172)	147 (102, 192)	0.05

Postoperative Outcomes

	Total (n=374)	BAV (n=190)	TAV (n=444)	p-value
Reoperation for Bleeding	36 (5.7)	11 (5.8)	25 (5.6)	0.94
Stroke	38 (6.0)	5 (2.6)	33 (7.4)	0.02
Paralysis	3 (0.5)	0 (0)	3 (0.7)	0.56
Acute Renal Failure	**59 (9.3)**	**6 (3.2)**	**53 (12)**	**0.0005**
Requiring Dialysis	**28 (4.5)**	**3 (1.6)**	**25 (5.7)**	**0.02**
After Discharge	16 (2.6)	2 (1.1)	14 (3.2)	0.17
Prolonged Ventilation	**190 (30)**	**36 (19)**	**154 (35)**	**<0.0001**
Pneumonia	**44 (6.9)**	**5 (2.6)**	**39 (8.8)**	**0.005**
MSOF	**22 (3.5)**	**1 (0.5)**	**21 (4.7)**	**0.008**
Atrial Fibrillation	198 (31)	52 (27)	146 (33)	0.17
Permanent Pacemaker	107 (17)	81 (18)	26 (14)	0.15
Hospital LOS (days)	**7 (5, 11)**	**6 (4, 8)**	**8 (5, 13)**	**<0.0001**
In-hospital Mortality	**40 (6.3)**	**6 (3.2)**	**34 (7.7)**	**0.03**

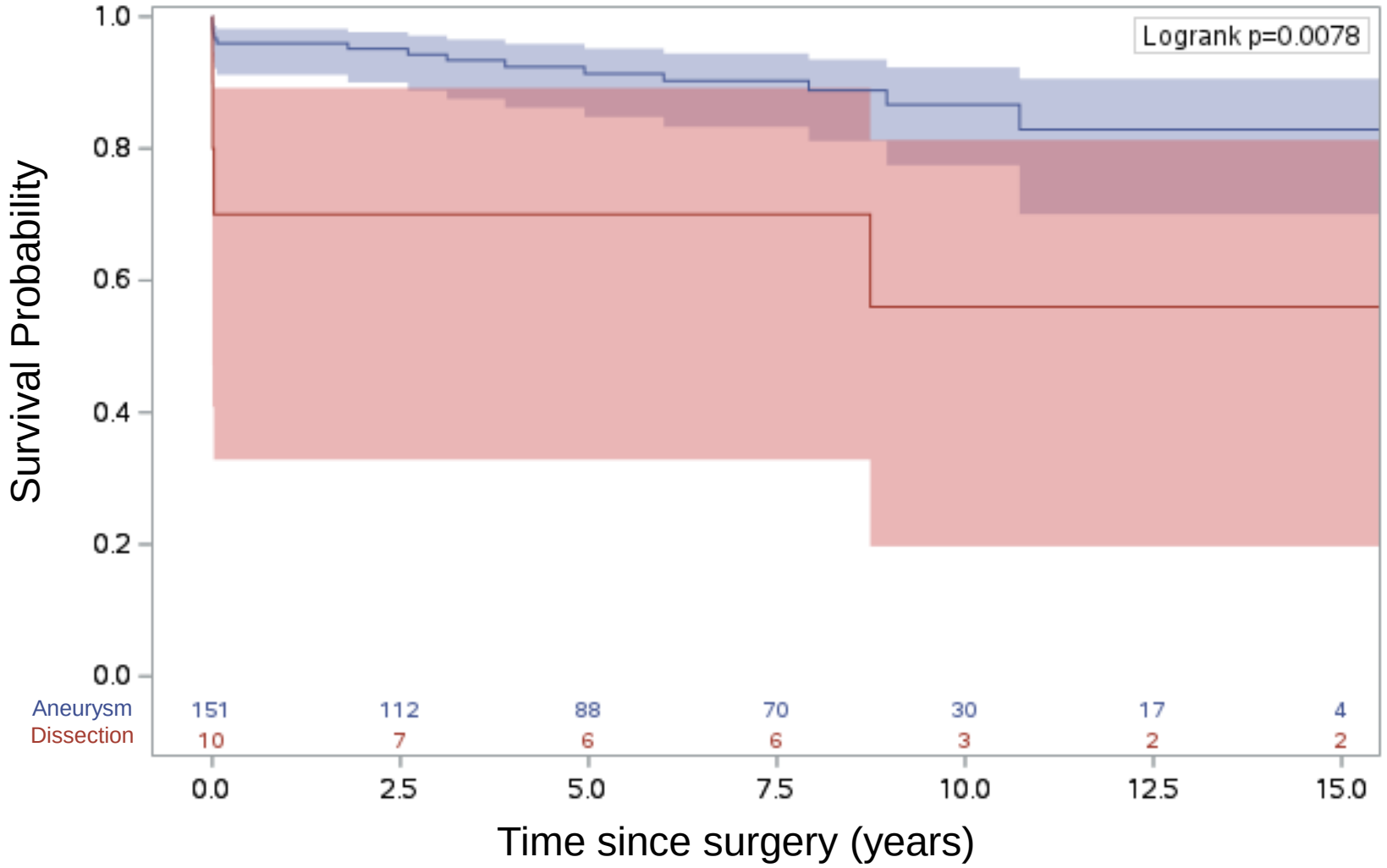
Long-term Survival



12-year Survival

BAV	81% (69%, 88%)
TAV	58% (47%, 68%)

Long-term Survival – BAV Subgroup



Conclusion

- Patients with BAV comprise ~1/3 of patients undergoing aortic root/ascending replacement
- BAV patients present more commonly for elective thoracic aortic aneurysms than emergent aortic dissections
  - Dissection (BAV 6% vs TAV 40%)
- Larger studies are needed to parse out BAV aortopathy; however, BAV may NOT be associated with weaker aortas more prone to dissection