

주최·주관 대한심장혈관흉부외과학회

# 2024 대한심장혈관흉부외과학회 제56차 추계학술대회

2024. 10. 31 (Thu) - 11. 01 (Fri) 여수 엑스포 컨벤션센터

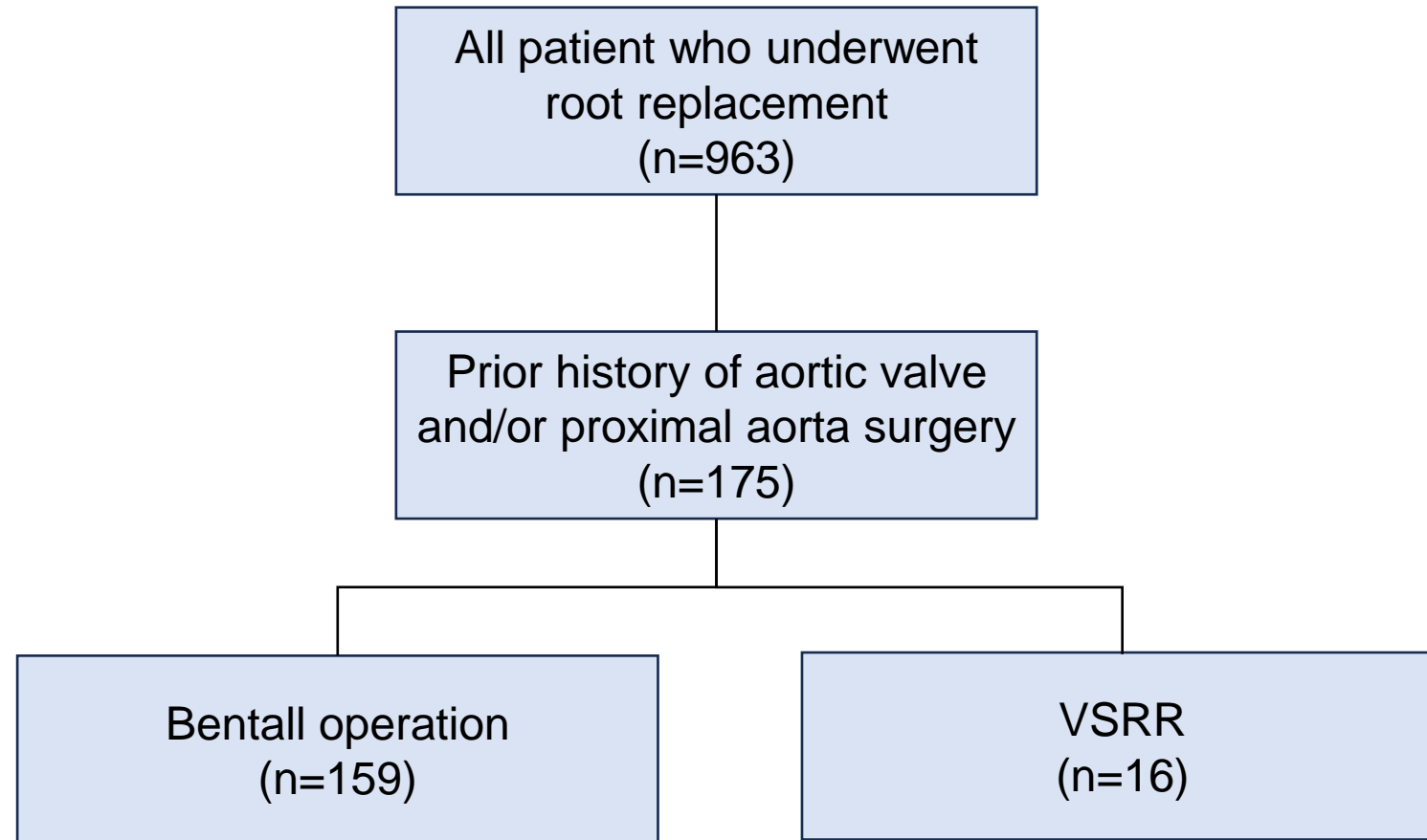


## Surgical Outcomes of Re-operative Root Replacement

- The generalization of surgical treatments for **aortic valve** and **aortic diseases** has led to mounting burden of need for **re-operative aortic root procedures**
- The aim of this study is to evaluate the **outcomes** of **redo-aortic root replacement**

- From Jan 1993 to Dec 2022
  - Single tertiary center
- Primary outcome: **all-cause mortality**
- Secondary outcome: **composite outcome of death, stroke and reoperation**
- **Inverse Probability Treatment Weighting** in comparisons between Bentall and Valve-Sparing procedures

## Patient Flow

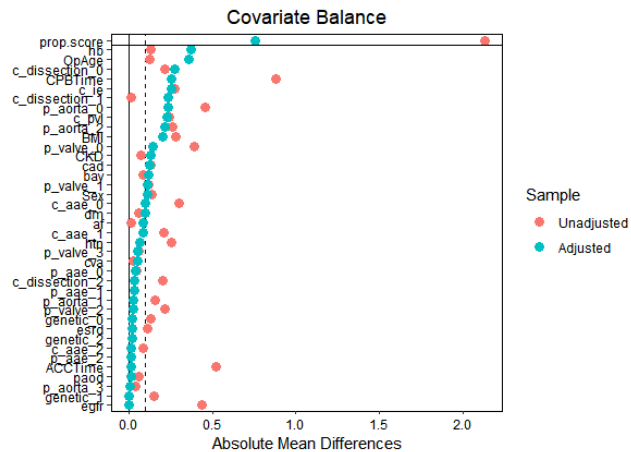


Baseline characteristics of Re-operative root surgery according to surgical techniques and adjusted using IPTW

Variable	Before Adjustment				After Adjustment*			
	Bentall	VSRR	p-value	SMD	Bentall	VSRR	p-value	SMD
	(N = 159)	(N = 16)			(N = 159)	(N = 16)		
Baseline demographics								
Age (mean (SD))	55.01 (15.50)	56.81 (13.00)	0.654	0.126	55.14 (15.39)	60.28 (12.84)	0.257	0.363
Male (%)	98 (61.6)	12 (75.0)	0.434	0.29	98.5 (62.0)	11.6 (72.8)	0.563	0.232
BMI (mean (SD))	23.29 (4.13)	24.35 (3.39)	0.324	0.28	23.34 (4.10)	24.09 (2.07)	0.12	0.232
Hb (mean (SD))	11.69 (2.23)	11.97 (2.11)	0.631	0.129	11.74 (2.21)	12.55 (2.30)	0.365	0.358
eGFR (mean (SD))	78.05 (28.16)	64.19 (34.58)	0.068	0.44	78.10 (27.79)	78.16 (28.48)	0.995	0.002
Bicuspid valve	23 (14.5)	1 (6.2)	0.597	0.272	22.1 (13.9)	0.4 (2.5)	0.056	0.428
Genetic disease			0.297	0.4			0.864	0.191
Marfan syndrome (%)	26 (16.4)	5 (31.2)			27.5 (17.3)	2.7 (17.1)		
Others (%)	3 (1.9)	0 (0.0)			2.8 (1.8)	0.0 (0.0)		
Vasculitis syndrome (%)	17 (10.7)	0 (0.0)	0.35	0.489	16.3 (10.2)	0.0 (0.0)	0.285	0.478
Baseline comorbidities, n (%)								
Diabetes Mellitus	19 (11.9)	1 (6.2)	0.786	0.199	18.1 (11.4)	0.3 (2.0)	0.056	0.385
Hypertension	39 (24.5)	8 (50.0)	0.058	0.546	39.6 (24.9)	3.0 (18.7)	0.562	0.152
Atrial fibrillation	22 (13.8)	2 (12.5)	>0.99	0.04	21.6 (13.6)	0.8 (4.9)	0.175	0.305
Coronary artery disease	21 (13.2)	0 (0.0)	0.252	0.552	19.8 (12.4)	0.0 (0.0)	0.24	0.533
COPD	3 (1.9)	0 (0.0)	>0.99	0.196	2.8 (1.8)	0.0 (0.0)	0.615	0.19
CVA	14 (8.8)	1 (6.2)	>0.99	0.097	14.0 (8.8)	0.6 (3.6)	0.389	0.214

VSRR, valve sparing root replacement; SMD, standardized mean difference; SD, standard deviation; BMI, body mass index; eGFR, estimated glomerular filtration rate; COPD, chronic obstructive pulmonary disease; CVA, cerebral vascular accident

Variable	Before Adjustment				After Adjustment <sup>*</sup>			
	Bentall	VSRR	p-value	SMD	Bentall	VSRR	p-value	SMD
	(N = 159)	(N = 16)			(N = 159)	(N = 16)		
Etiology of Index Re-operative Root Replacement								
Dissection			0.01	0.595			0.055	0.701
Acute (%)	8 (5.0)	1 (6.2)			8.6 (5.4)	4.6 (29.0)		
Chronic (%)	8 (5.0)	4 (25.0)			8.7 (5.5)	1.4 (8.9)		
Root aneurysm			0.059	0.625			0.787	0.208
With AR (%)	36 (22.6)	7 (43.8)			37.2 (23.4)	5.1 (31.8)		
Without AR (%)	16 (10.1)	3 (18.8)			17.4 (10.9)	2.0 (12.3)		
Prosthetic valve Failure (%)	38 (23.9)	0 (0.0)	0.058	0.793	35.8 (22.5)	0.0 (0.0)	0.111	0.762
Infective Endocarditis (%)	43 (27.0)	0 (0.0)	0.037	0.861	40.5 (25.5)	0.0 (0.0)	0.087	0.827
Operative profiles								
CPB time (mean (SD))	253.92 (117.96)	166.12 (77.79)	0.004	0.879	250.52 (116.46)	224.88 (92.81)	0.437	0.244
ACC time (mean (SD))	157.03 (57.06)	128.50 (51.64)	0.056	0.524	156.37 (56.74)	155.78 (60.75)	0.979	0.01

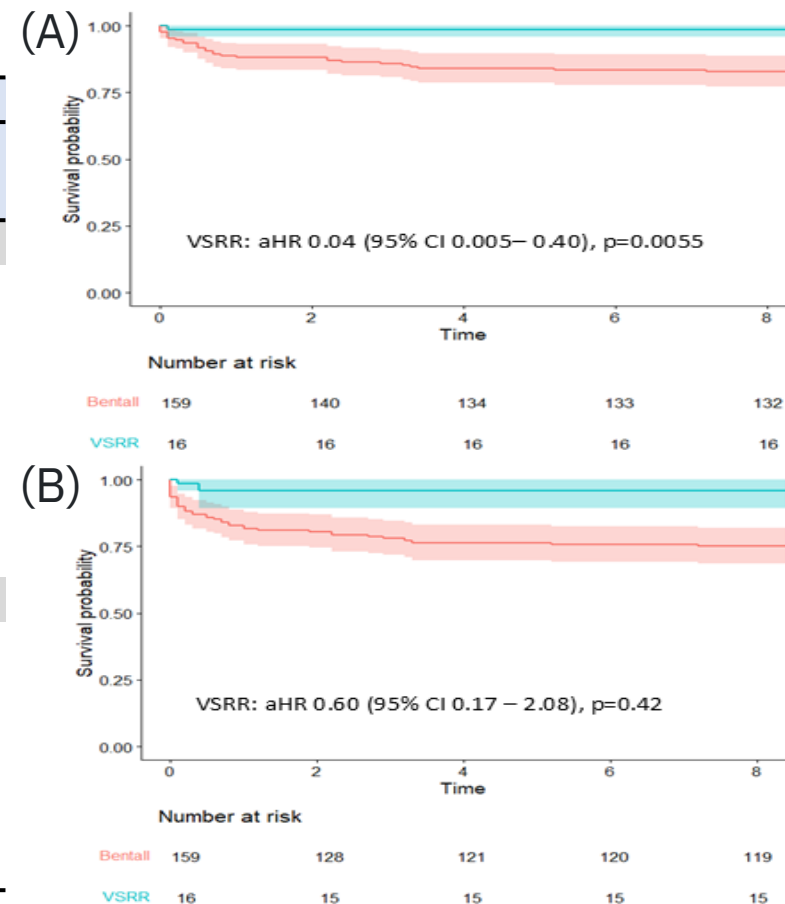


## Comparison of outcomes according to root surgery techniques using IPTW

Variables	After Adjustment		p-value
	Bentall	VSRR	
	(N = 159)	(N = 16)	
Early Outcomes, n (%)			
Death	17.9 (11.3)	0.2 (1.5)	0.026
Stroke			0.826
Disabling	1.9 (1.2)	0 (0.0)	
Non-disabling	2.7 (1.7)	0 (0.0)	
Bleeding	23.7 (14.9)	0.0 (0.0)	0.202
AKI requiring CRRT	16.0 (10.1)	0.2 (1.5)	0.040
LCOS requiring ECMO	20.7 (13.0)	3.1 (19.5)	0.646
Long-term Outcomes, n (%/PY)			
Death	37.3 (4.88)	0.2 (0.26)	<0.001
Reoperation	18.2 (2.68)	3.4 (4.98)	0.466
Stroke			0.642
Disabling	3.8 (0.52)	0 (0.0)	
Non-disabling	6.5 (0.88)	0 (0.0)	
Composite outcome	56.3 (8.39)	3.6 (5.33)	0.493

**VSRR was related to favorable early and late survival.**

## IPTW-adjusted KM curve for All-cause death (A) and Composite outcome (B)



**VSRR was associated with a decrease in all-cause mortality.**

## Multivariable Cox-regression analysis for the Clinical outcomes

Variables	Univariable		Multivariable	
	Unadjusted HR (95% CI)	P-value	Adjusted HR (95% CI) *	P-value
<b>All-cause death</b>				
Age > 65 yrs	2.44 (1.30-4.58)	0.005	1.44 (0.75-2.75)	0.27
<b>Infective endocarditis</b>	<b>2.54 (1.34-4.80)</b>	<b>0.004</b>	<b>2.30 (1.22-4.36)</b>	<b>0.01</b>
<b>Previous coronary artery disease</b>	<b>3.07 (1.50-6.31)</b>	<b>0.002</b>	<b>2.42 (1.18-4.96)</b>	<b>0.016</b>
<b>CKD</b>	<b>3.28 (1.75-6.15)</b>	<b>&lt;0.001</b>	<b>2.47 (1.32-4.63)</b>	<b>0.005</b>
Marfan syndrome	0.33 (0.10-1.06)	0.062	0.71 (0.20-2.56)	0.60
<b>VSRR</b>	<b>0.26 (0.04-1.88)</b>	<b>0.181</b>	<b>0.07 (0.01-0.66)</b>	<b>0.02</b>
<b>Composite outcome</b>				
Age > 65 yrs	2.04 (1.22-3.41)	0.007	1.45 (0.81-2.60)	0.22
<b>Infective endocarditis</b>	<b>2.77 (1.65-4.67)</b>	<b>&lt;0.001</b>	<b>2.58 (1.45-4.61)</b>	<b>0.0014</b>
Previous coronary artery disease	2.32 (1.23-4.39)	0.009	1.99 (0.95-4.17)	0.07
CKD	1.9 (1.11-3.26)	0.019	1.61 (0.92-2.82)	0.09
Bicuspid aortic valve	1.84 (0.95-3.56)	0.069	1.25 (0.58-2.72)	0.57
VSRR	0.51 (0.16-1.62)	0.252	0.82 (0.18-3.66)	0.80

VSRR, valve sparing root replacement; HR, hazard ratio; CI, confidence interval;

**VSRR, Infective endocarditis, coronary artery disease, CKD was associated with higher risk of mortality**

# Conclusion

- Despite the technical challenges associated with **redo-ARR**, both **early and late outcomes were acceptable**, and **VSRR** remains a **viable option for selected patients**.