

Impact of Associated Procedures on Long-Term Outcomes in Valve-Sparing Aortic Root Replacement: A Propensity Score Matched Analysis

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Introduction

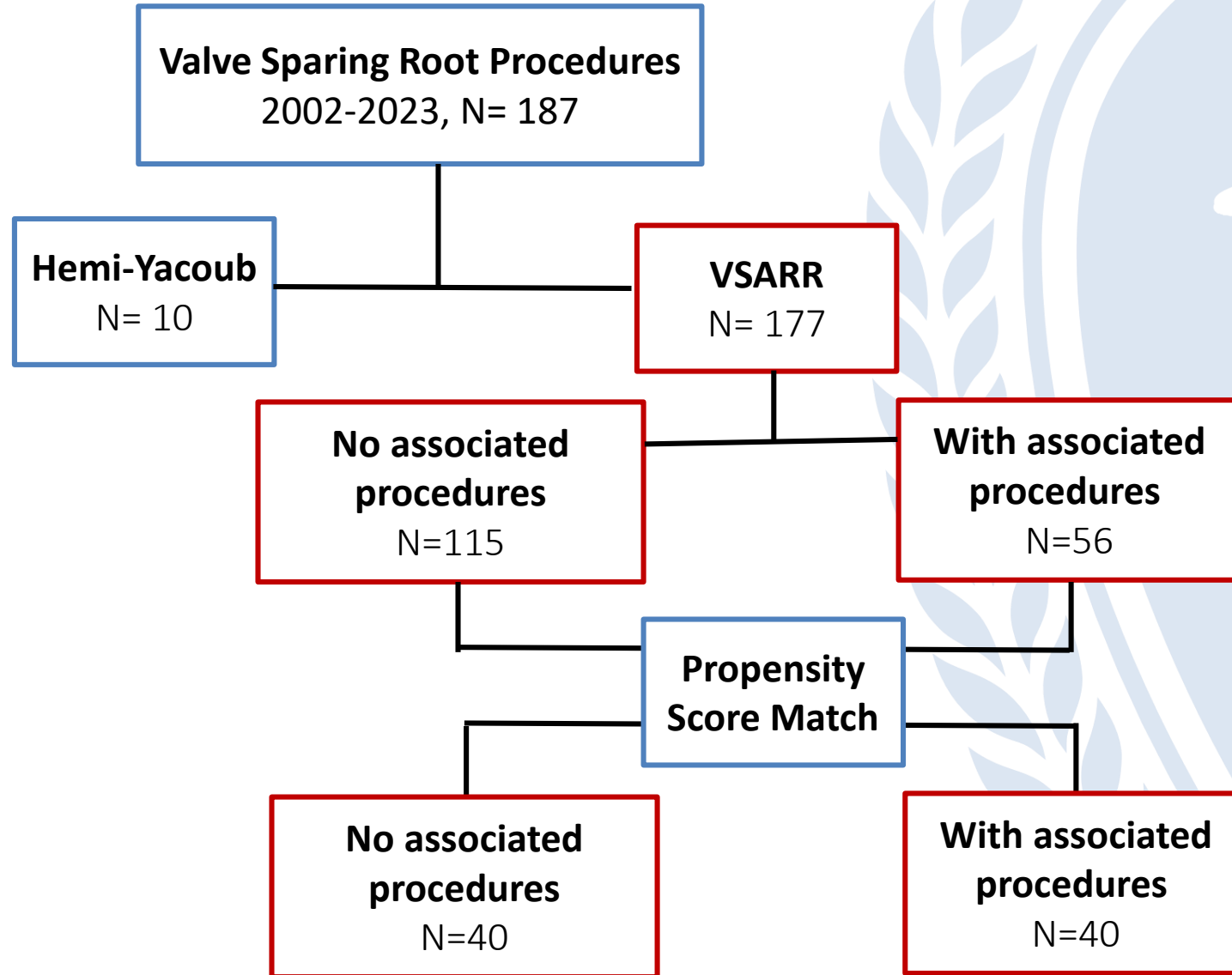
- Aortic valve-sparing aortic root replacement (VSARR) is accepted as an excellent option for patients with isolated aortic root pathology with longer CPB times.
- The implications of extending surgical duration, especially when VSARR is performed alongside other cardiac procedures are not well-established.
- This study aims to compare outcomes between patients undergoing isolated VSARR and those undergoing VSARR with associated procedures.

Methods

- We conducted a retrospective analysis of 171 patients who underwent VSARR, with 115 patients in the isolated procedure (IP) group and 56 patients in the associated procedures (AP) group.
- A propensity score matching (PSM) was employed to create 40 well-matched pairs. Patient characteristics, including sex, age, comorbidities, and clinical parameters were used to calculate propensity scores.
- Outcomes measures were compared before and after PSM.
- The Kaplan-Meier method was used to establish long-term survival and freedom from valve-related reintervention.

Outcomes in Associated
Procedures in Valve-Sparing
Aortic Root Replacement

Sampling Algorithm



Outcomes in Associated Procedures in Valve-Sparing Aortic Root Replacement

Associated Procedures

Associated procedures	Unmatched	Matched
	VSARR Combined n=56	VSARR Combined n=40
CABG	8	6
CABG + MAZE	1	0
Hemiarch reconstruction + PFO closure	1	0
Hemiarch reconstruction	12	10
FET	6	4
Total Arch Reconstruction	4	4
Total Arch Reconstruction + MVR	1	1
MVr	9	8
MVr + ASD closure	1	0
MVr + PFO closure + AVP + LAA closure	1	1
MVr + Maze	1	0
Maze	2	0
ASD closure	2	2
TVr	1	0
Closure coronary (DA) fistula to pulmonary artery	1	0
PFO closure	3	3
Abdominal Aorta repair	2	1

Patient and perioperative characteristics in matched and unmatched cohorts



	Unmatched			Matched PSM			SMD
	VSARR Isolated n=115	VSARR Combined n=56	p-value	VSARR Isolated n=40	VSARR Combined n=40	p-value	
Male gender	92(80)	48(85.7)	0.363	33(82.5)	34(85)	1,000	-0.062
Body mass index kg/m2	26(23.5-27.3)	26(22.7-28)	0.758	26(23.6-27.6)	26(23-27.3)	0.900	0.021
Age (years)	50.5(38-58)	53(45-61)	0.230	52(38-57)	52(37-60)	0.867	-0.025
Diabetes	3(2.6)	2(3.6)	0.663	1(2.5)	1(2.5)	1,000	0.000
Dyslipidemia	24(20.9)	15(26.8)	0.387	12(30)	9(22.5)	0.607	-0.184
Preoperative Dialysis	2(1.7)	3(5.4)	0.332	0(0)	0(0)	-	0.000
Hypertension	42(36.5)	27(48.2)	0.144	17(42.5)	16(40)	1,000	-0.052
Tobacco Use	8(7)	7(12.5)	0.256	3(7.5)	4(10)	1,000	-0.098
COPD	4(3.5)	5(8.9)	0.155	2(5)	3(7.5)	1,000	-0.136
Cerebrovascular Disease	4(3.5)	2(3.6)	1,000	4(10)	2(5)	0.687	-0.272
Previous CBG	0(0)	1(1.8)	0.327	0(0)	0(0)	-	-
Previous Valve Surgery	3(2.6)	1(1.8)	1,000	1(2.5)	1(2.5)	1,000	0.000
Previous Aortic Artery surgery	3(2.6)	1(1.8)	1,000	1(2.5)	1(2.5)	1,000	0.000
Previous AMI	0(0)	0(0)	0.881	0(0)	0(0)	-	-
Heart Failure	21(18.3)	14(25)	0.305	6(15)	7(17.5)	1,000	0.064
NYHA Functional Class			0.019			1,000	0.000
I	26(22.6)	7(12.5)		7(17.5)	7(17.5)		
II	79(68.7)	37(66.1)		29(72.5)	29(72.5)		
III	10(8.7)	9(16.1)		4(10)	4(10)		
IV	0(0)	3(5.4)		0(0)	0(0)		
Atrial fibrillation	1(0.9)	4(7.1)	0.040	1(2.5)	0(0)	1,000	0.268
EuroSCORE II %	4(3.3-5.2)	5(3.8-7.5)	0.002	4.1(3.3-5.5)	4.4(3.7-5.4)	0.835	0.087
LVEF (%)	52(49-60)	51(47.2-55)	0.150	51(44.2-55)	51(50-55.7)	0.281	-0.207
Aortic Valve Regurgitation			0.226			0.481	0.098
No Regurgitation	36(31.3)	13(23.2)		15(37.5)	12(30)		
Mild	8(7)	2(3.6)		3(7.5)	2(5)		
Moderate	15(13)	7(12.5)		8(20)	5(12.5)		
Severe	56(48.7)	32(57.1)		14(35)	21(52.5)		
No documented	0(0)	2(3.6)		0(0)	0(0)		

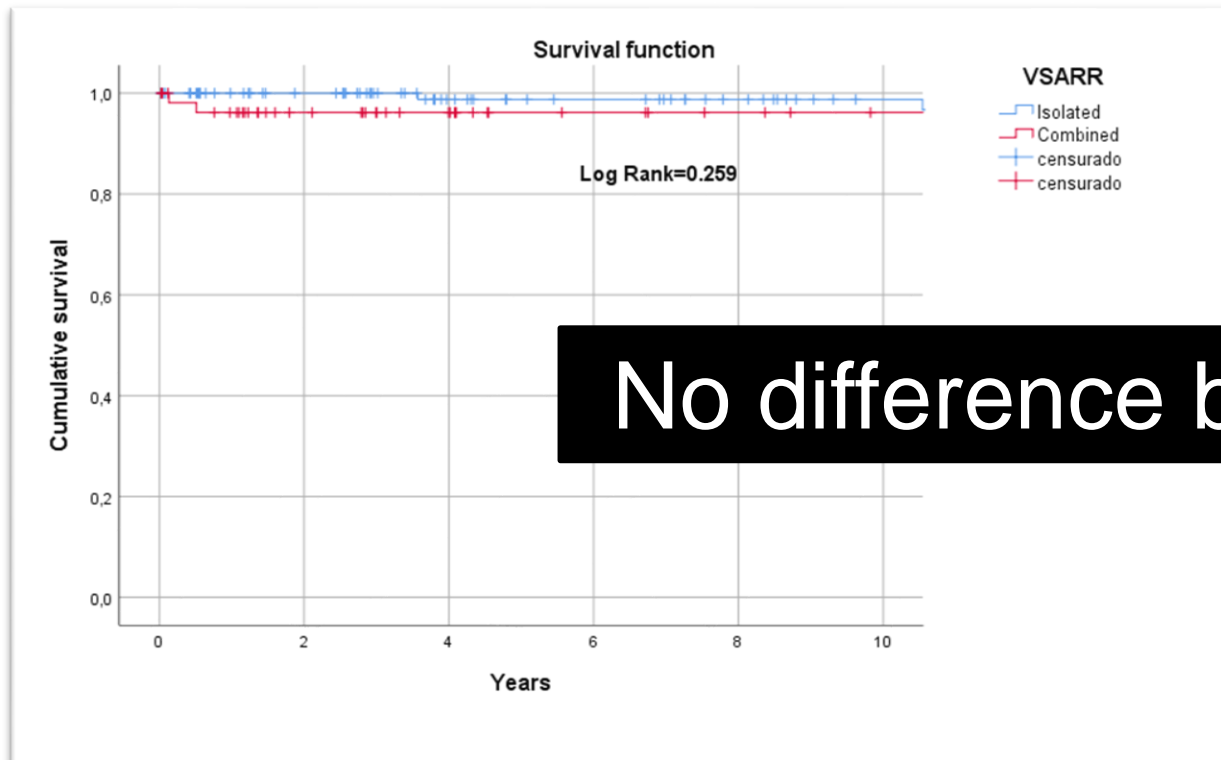
30-day outcomes in unmatched and matched cohorts



30-day Outcomes	Unmatched			Matched PSM		
	VSARR Isolated n=115	VSARR Combined n=56	p-value	VSARR Isolated n=40	VSARR Combined n=40	p-value
Red Blood Cell Transfusion						
Intraoperative	33(28.7)	31(55.4)	0.001	12(30)	20(50)	0.134
Postoperative	28(24.3)	27(48.2)	0.002	10(25)	17(42.5)	0.189
CPB min.	190(175-201)	221(203-266)	0.000	190(178-199)	220(206-267)	0.001
AXC min	165(151-175)	194(172-210)	0.000	166(159-177)	193(173-212)	0.005
Deep Sternal Wound Infection	0(0)	2(3.6)	0.106	0(0)	1(2.5)	1,000
Reoperation for Bleeding	8(7)	6(10.7)	0.391	4(10)	0(0)	0.125
Sepsis	0(0)	2(3.6)	0.106	0(0)	2(5)	0.500
Clinical Stroke	0(0)	1(1.8)	0.327	0(0)	1(2.5)	1,000
Paralysis (>24 h)	0(0)	1(1.8)	0.327	0(0)	1(2.5)	1,000
Prolonged Ventilation (>24 h)	0(0)	8(14.3)	0.000	0(0)	4(10)	0.125
Dialysis	0(0)	4(7.1)	0.011	0(0)	3(7.5)	0.250
New pacemaker	1(0,9)	1(1.8)	0.549	1(2.5)	1(2.5)	1,000
Cardiac Arrest	1(0,9)	0(0)	1,000	1(2.5)	0(0)	1,000
Perioperative AMI	0(0)	0(0)	-	0(0)	0(0)	-
Liver Failure	0(0)	1(1.8)	0.327	0(0)	1(2.5)	1,000
New onset AF	19(16,5)	9(16,1)	1,000	4(10)	6(15)	0.727
Mortality	0(0)	2(3.6)	0.106	0(0)	2(5)	0.500
Length of stay						
Preoperative (d)	1(1-4)	1.5(1-6)	0.353	2(1-5)	1(1-4)	0.158
Intensive care unit (d)	1(1-2)	3.2(2-6)	0.000	1(1-2)	2.8(1-5.7)	0.003
Hospital (d)	5(4-7)	7(5-10)	0.000	5(4-6)	6.5(4.2-10)	0.032

Data are presented as median with the 25th to 75th percentile interval or n (%). AXC: aortic cross-clamp; CPB: cardiopulmonary bypass; VSARR: VSARR; Mortality: mortality; Dialysis: dialysis; Prolonged Ventilation (>24 h): prolonged ventilation (>24 h); Paralysis (>24 h): paralysis (>24 h); Clinical Stroke: clinical stroke; Sepsis: sepsis; Reoperation for Bleeding: reoperation for bleeding; Deep Sternal Wound Infection: deep sternal wound infection; Perioperative AMI: perioperative AMI; Liver Failure: liver failure; New onset AF: new onset atrial fibrillation; Mortality: mortality; Intensive care unit (d): intensive care unit (days); Preoperative (d): preoperative (days); Hospital (d): hospital (days).

Kaplan-Meier survival in unmatched cohort at 10 years

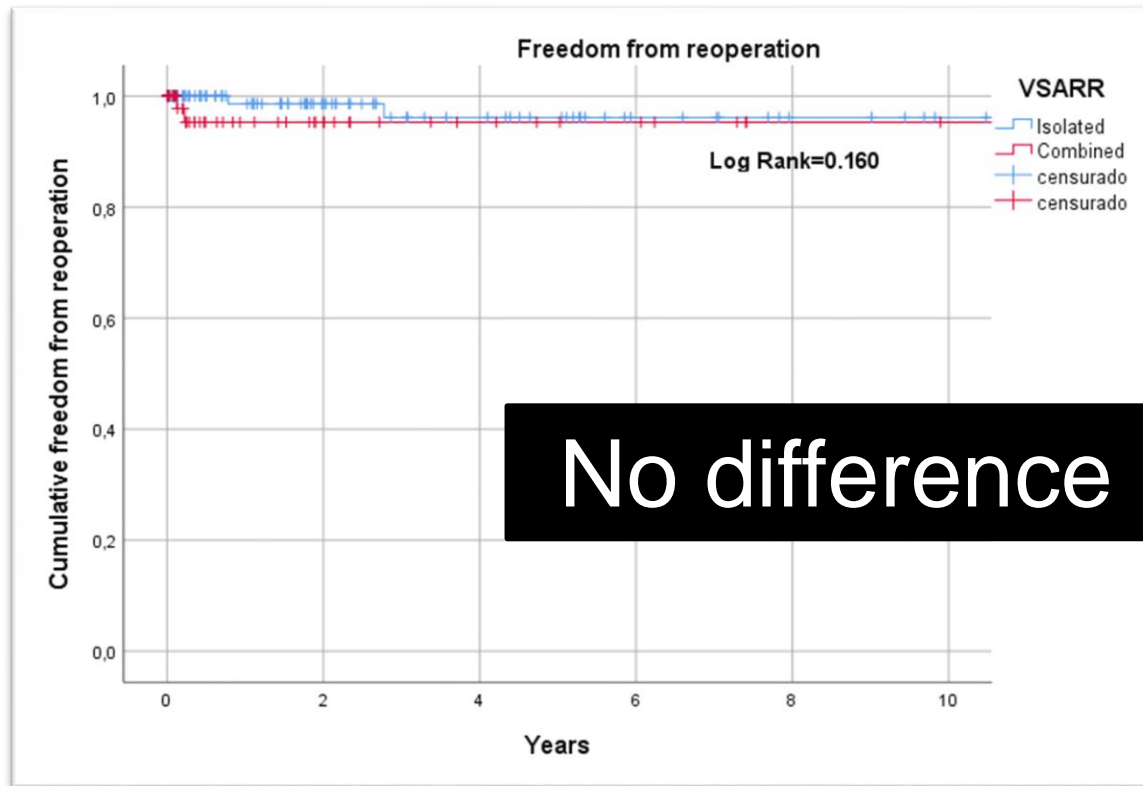


Kaplan-Meier survival in matched cohort at 10 years

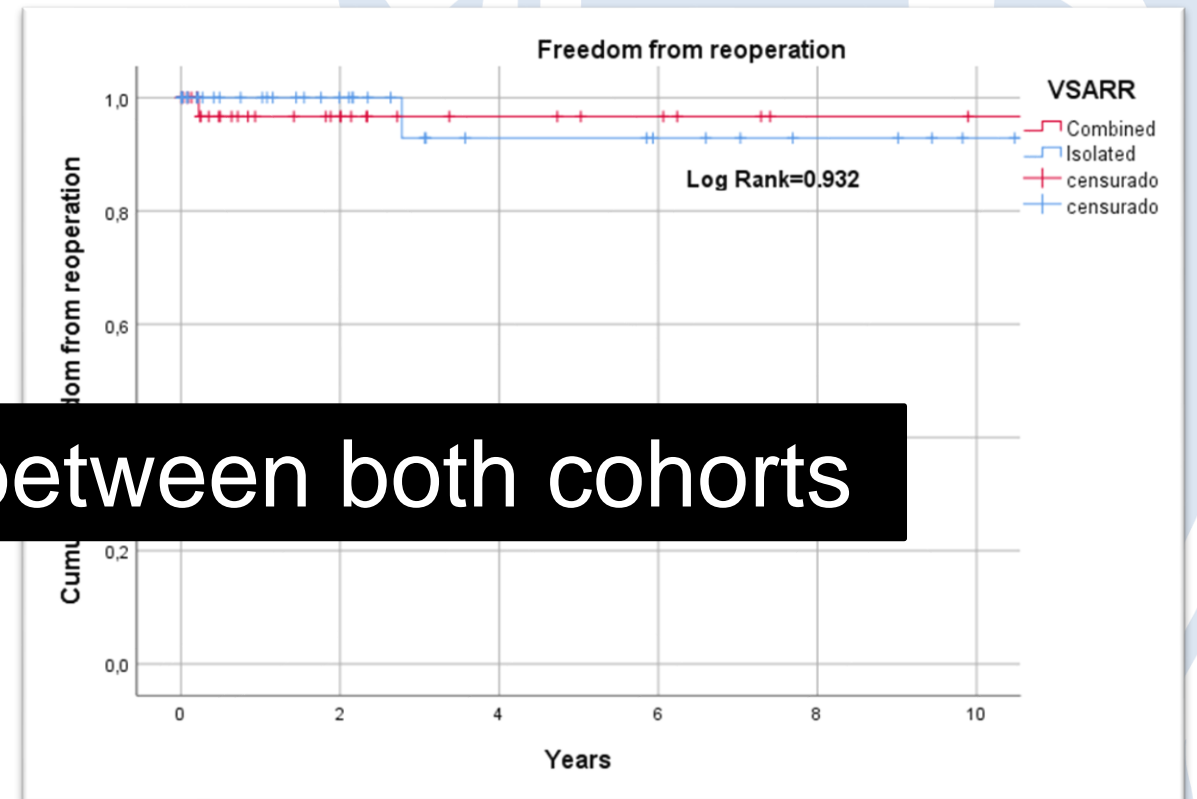


No difference between both cohorts

Freedom from reoperation in unmatched cohort at 10 years



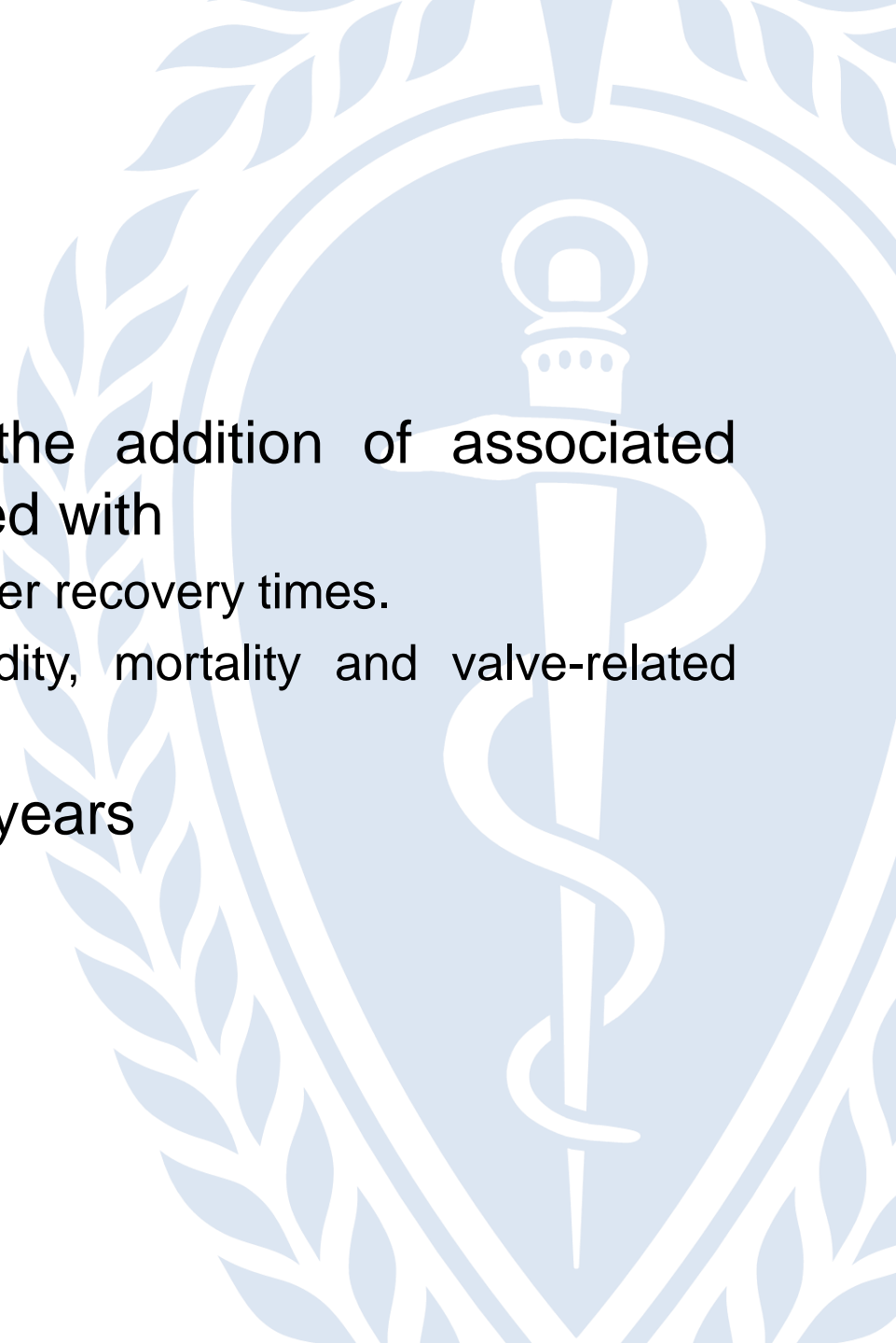
Freedom from reoperation in matched cohort at 10 years



No difference between both cohorts

Conclusions

- In patients undergoing VSARR, the addition of associated procedures appears to be associated with
 - Increased surgical complexity, and longer recovery times.
 - Do not increase postoperative morbidity, mortality and valve-related reintervention at 30 days and 10 years.
- We plan to follow this cohort for 20 years



Take Home Message

- VSARR is a feasible and safe option at long-term when performed alongside other cardiac procedures in a referral center for aortic valve disease with an experienced and dedicated team.

