Mitral Regurgitation Severity and Echocardiographic Changes at 1 Year Postoperative: A Comparative Study of Surgical Aortic Valve Replacement Versus Transcatheter Aortic Valve Replacement

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Abstract

Background: Limited research exists on evolution of coexisting mitral valve regurgitation (MR) severity following transcatheter aortic valve replacement (TAVR) and surgical aortic valve replacement (SAVR) in patients with aortic stenosis (AS). In addition, very few studies have compared changes in echocardiographic measurements from preop to 1- year postop between TAVR and SAVR groups. This study aims to evaluate changes in MR severity and echocardiographic parameters at 1 year postop.

Methods: Patients with AS and MR who underwent TAVR or SAVR from January 2000 to January 2023 were categorized based on preoperative MR severity. A Chi-square test and Fisher's exact test, where appropriate were conducted to examine the association between demographics or comorbidities and mitral valve regurgitation severity. Survival between two groups was compared using Kaplan-Meier curves. A Mann-Whitney test was utilized to examine changes in echocardiographic parameters pre- and 1 year postop.

Results: Of 165 patients, 80.0% underwent SAVR. In the SAVR group, 43 (32.6%) patients had coronary artery bypass grafting, 7 (5.3%) underwent mitral valve replacement (MVR), and 3 (2.3%) had endocarditis at surgery. Median age of TAVR patients with mild and moderate/severe MR was 80.0 and 83.5 years, respectively, compared to 71.0 and 76.5 years in SAVR group. Survival curves showed no significant difference between 2 procedures (p=0.0845). Within patients who underwent TAVR, a significantly higher proportion of patients with moderate/severe MR preop had congestive heart failure compared to patients with mild MR preop (100% vs 56.0%, p=0.031). For change in MR severity analysis, 25 patients were excluded due to missing follow-up echocardiographic data. Most patients with mild MR in both TAVR (79.2%) and SAVR (66.7%) groups experienced no change in MR severity. A higher percentage of those with moderate/severe MR showed grade improvement (62.5% in TAVR, 91.7% in SAVR without MVR, and 100% in SAVR with MVR). When comparing Echocardiographic parameters, there was no statistically significant difference between SAVR and TAVR groups, regarding Δ change from preop to 1-year postop measurements in median left ventricular ejection fraction (LVEF %) (0 vs 0, p=0.495), left ventricular internal diameter end diastolic (LVIDd cm) (0.01 vs 0.14, p=0.948), left ventricular internal diameter end systolic (LVIDs cm) (-0.34 vs 0.24, p=0.131), left ventricular outflow tract diameter (LVOTd cm) (-0.06 vs -0.10, p=0.838), left atrial dimension (LAd cm) (0.16 vs -0.25, p=0.262), and mitral valve E/A ratio (-0.001 vs 0.10, p=0.469). There were no significant differences in preop comorbidities or operative characteristics examined between improved and not improved MR groups.

Conclusion: Patients with moderate/severe MR who underwent SAVR or TAVR predominantly experienced improved MR grade at one year postoperatively, whereas those with mild MR were likely to remain unchanged. Comparison of echocardiographic changes from preop to 1-year postop shows no significant difference between SAVR and TAVR groups. No predictive preop or operative characteristics were identified. Our findings provide valuable insights for decision-making in performing TAVR and SAVR on patients with AS and MR, particularly those with

moderate to severe MR and multiple comorbidities, who may face higher risks from concomitant valve replacement procedures.

Introduction

Aortic stenosis (AS) is one of the most prevalent clinically significant valvular heart diseases, often coexisting with mitral regurgitation (MR) (1,2). Among patients with valvular heart disease, combined AS and MR is present in approximately 25% of cases. Particularly, coexisting moderate to severe MR is reported in 3% to 74% of patients undergoing transcatheter (TAVR) or surgical aortic valve replacement (SAVR) (3-10). The persistence of MR following aortic valve replacement is a well-documented contributor to increased morbidity and higher rates of cardiovascular hospitalization (11). While double-valve surgery is an option for severe MR, its associated risks, including increased in-hospital mortality, necessitate careful patient selection (12).

Previous studies indicate that moderate to severe MR is associated with higher two-year mortality among patients undergoing SAVR but not TAVR (13, 14). A large meta-analysis suggests that moderate concomitant MR may increase both early and late mortality after SAVR (13), underscoring the potential need for mitral intervention even in cases of moderate MR. However, evidence also suggests that isolated SAVR can lead to MR improvement due to hemodynamic and left ventricular function alterations (5). Despite these findings, limited data exist on the direct comparison of MR outcomes between SAVR and TAVR in patients with combined aortic and mitral valve disease (14, 15).

Given that persistent MR is associated with increased mortality, identifying preoperative predictors of MR improvement or worsening is critical for optimizing patient management. This study aims to retrospectively analyze long-term MR outcomes following SAVR and TAVR to determine the optimal procedural approach for patients with varying degrees of MR severity. Specifically, we will:

1. Compare the impact of MR on mortality and survival following TAVR and SAVR.
2. Assess changes in MR severity at 1 year post-TAVR and SAVR.
3. Assess changes in echocardiographic parameters at 1 year post-TAVR and SAVR.
4. Identify predictive preop factors for MR improvement.

By addressing these objectives, our findings will provide valuable insights into the management of patients with concomitant AS and MR, facilitating more informed clinical decision-making and potentially improving long-term outcomes.

Methods

Study Population

Data were collected from patients age 18 years and older diagnosed with AS and MR who underwent either TAVR or SAVR. Patients with a history of other valvular diseases or cardiovascular conditions prior to the procedure were excluded from the study. The initial sample included 185 patients; however, individuals with an "absent" or "unknown" MR status were excluded. Additionally, one patient was removed due to undergoing an aortic valve replacement not associated with aortic stenosis. After these exclusions, the final study cohort consisted of 165 patients. To evaluate MR severity changes from preoperative assessment to one-year postoperative follow-up, 25 additional patients were excluded due to absence of postop echocardiographic values.

Statistical Analysis

Descriptive statistics were utilized to summarize patient characteristics. Categorical variables were presented as frequencies and percentages, while continuous variables were reported as medians with interquartile ranges (IQR). Group comparisons were conducted using the Chi-square test or Fisher's exact test, as appropriate, to analyze associations between demographic factors, comorbidities, and MR severity within each valve replacement group. The Mann-Whitney test was applied to assess differences in continuous characteristics across preoperative MR severity groups and to evaluate changes in echocardiographic parameters at preoperative and 1-year postoperative intervals. Additionally, a Kaplan-Meier survival analysis was performed to compare long-term survival outcomes between patients undergoing TAVR and SAVR. This comprehensive approach aims to identify factors predictive of MR improvement post-aortic valve replacement, thereby guiding optimal procedural decisions and enhancing patient outcomes.

Results

Of the 165 patients included in the study, 80% underwent SAVR. The median age of TAVR patients with mild and moderate/severe MR was 80.0 and 83.5 years, respectively, compared to 71.0 and 76.5 years in the SAVR group. The median age in the study population was 74.0 years, with a higher proportion of males (65.5%). Additional patient characteristics are presented in Table 1.

	Total (N=165)
Age at time of aortic valve replacement procedure	
Median (IQR)	74.0 (66.0, 80.0)
Race, n (%)	
Unknown	1 (0.6%)
White	164 (99.4%)
Sex, n (%)	
Female	57 (34.5%)
Male	108 (65.5%)
Ethnicity, n (%)	
Hispanic or Latino	2 (1.2%)
Not Hispanic or Latino	125 (75.8%)
Unknown	38 (23.0%)
Preop MR severity, n (%)	
Mild	129 (78.2%)
Moderate	23 (13.9%)
Severe	13 (7.9%)
Aortic valve replacement procedure type, n (%)	
SAVR	132 (80.0%)
TAVR	33 (20.0%)

Table 1. Demographics and Preop MR Severity

Table 2 provides a comparison of demographics between preop MR severity levels within TAVR and SAVR procedure groups. Within patients who underwent TAVR, a significantly higher proportion of patients with moderate/severe MR preop had congestive heart failure compared to patients with mild MR preop (100% vs 56.0%, p-value=0.031). Within patients who underwent SAVR, patients who had moderate/severe MR prior to the procedure were significantly older with a median age of 76.5 years (76.5 years vs 71.0 years, p-value=0.005).

Table 3 displays preop echocardiographic results in each preop MR severity group for TAVR and SAVR procedure groups. Within the TAVR group, the ejection fraction (EF) preop value (60.0 vs 42.5) and mitral valve (MV) A point value (113.2 vs 96.7) were higher for patients with mild MR prior to the procedure. Within the SAVR group, the median left ventricular internal diameter end diastolic was slightly higher for patients with moderate/severe MR (5.0 vs 4.7).

Table 4 displays mortality outcomes for each preop MR severity group according to the aortic valve replacement type. Procedural related mortality was defined as death within 30 days of TAVR or SAVR procedure. Within SAVR procedures, a higher proportion of patients with moderate/severe MR had a mortality outcome (92.9% vs 61.5%, p-value=0.002). Survival analysis showed no significant difference between TAVR and SAVR groups (p=0.0845) (Figure 1).

In the analysis of MR severity changes as shown in Table 5, 25 patients were excluded due to missing follow-up echocardiographic data. Within the SAVR group, 43 (32.6%) patients had coronary artery bypass grafting (CABG), 7 (5.3%) underwent mitral valve replacement (MVR), and 3 (2.3%) had endocarditis at surgery. Most patients with mild MR in both the TAVR (79.2%) and SAVR (66.7%) groups experienced no change in MR severity. However, a higher proportion of patients with moderate/severe MR showed improvement (62.5% in TAVR, 91.7% in SAVR without MVR, and 100% in SAVR with MVR).

Table 6 demonstrates changes in preop and 1-year postop echocardiographic results in each preop MR severity group for TAVR and SAVR procedures. Echocardiographic parameter comparisons between SAVR and TAVR groups revealed no statistically significant differences in preoperative to one-year postoperative changes in median left ventricular ejection fraction (LVEF %) (0 vs. 0, p=0.495), left ventricular internal diameter end diastolic (LVIDd cm) (0.01 vs. 0.14, p=0.948), left ventricular internal diameter end systolic (LVIDs cm) (-0.34 vs. 0.24, p=0.131), left ventricular outflow tract diameter (LVOTd cm) (-0.06 vs. -0.10, p=0.838), left atrial dimension (LAd cm) (0.16 vs. -0.25, p=0.262), and mitral valve E/A ratio (-0.001 vs. 0.10, p=0.469).

In order to help identify factors that might predict improvement in MR, patients that underwent aortic valve intervention with mild or greater MR preoperatively were evaluated for improvement in MR. Patients were divided into groups depending on whether there was improvement in MR (n=46) or no improvement/worsening in MR (n=94). Pre-operative (comorbidities) and operative characteristics

	TAVR			SAVR		
	Mild MR preop N=25	Moderate/severe MR preop (N=8)	P value	Mild MR preop N=104	Moderate/severe MR preop (N=28)	P value
Age						
Median (IQR)	80.0 (75.0, 85)	83.5 (77.5, 90)	0.302	71.0 (63.0, 76.5)	76.5 (71.5, 83)	0.005
Race, n (%)						
White	25 (100.0%)	8 (100.0%)	--	103 (99.0%)	28 (100%)	>0.999
Unknown	0 (0%)	0 (0%)		1 (1.0%)	0 (0%)	
Sex, n (%)						
Female	9 (36.0%)	4 (50.0%)	0.681	34 (32.7%)	10 (35.7%)	0.763
Male	16 (64.0%)	4 (50.0%)		70 (67.3%)	18 (64.3%)	
Ethnicity, n (%)						
Hispanic or Latino	0 (0%)	1 (12.5%)		1 (1.0%)	0 (0%)	
Not Hispanic or Latino	25 (100.0%)	7 (87.5%)	0.242	72 (69.2%)	21 (75.0%)	0.722
Unknown	0 (0%)	0 (0%)		31 (29.8%)	7 (25.0%)	
AFIB preop, n (%)						
No	18 (72.0%)	4 (50.0%)	0.392	60 (57.7%)	15 (53.6%)	0.696
Yes	7 (28.0%)	4 (50.0%)		44 (42.3%)	13 (46.4%)	
Pulmonary hypertension preop , n (%)						
No	20 (80.0%)	6 (75.0%)	>0.999	100 (96.2%)	28 (100%)	0.578
Yes	5 (20.0%)	2 (25.0%)		4 (3.8%)	0 (0%)	
CABG preop, n (%)						
No	25 (100%)	8 (100%)	--	97 (93.3%)	25 (89.3%)	0.442
Yes	0 (0%)	0 (0%)		7 (6.7%)	3 (10.7%)	
Myocardial infarction preop, n (%)						
No	15 (60.0%)	8 (100%)	0.072	90 (86.5%)	25 (89.3%)	>0.999
Yes	10 (40.0%)	0 (0%)		14 (13.5%)	3 (10.7%)	
Obesity preop, n (%)						
No	16 (64.0%)	4 (50.0%)	0.681	91 (87.5%)	25 (89.3%)	>0.999
Yes	9 (36.0%)	4 (50.0%)		13 (12.5%)	3 (10.7%)	
Diabetes preop, n (%)						
No	11 (44.0%)	5 (62.5%)	0.438	75 (72.1%)	24 (85.7%)	0.14
Yes	14 (56.0%)	3 (37.5%)		29 (27.9%)	4 (14.3%)	
Hypertension preop, n (%)						
No	7 (28.0%)	1 (12.5%)	0.643	33 (31.7%)	12 (42.9%)	0.27
Yes	18 (72.0%)	7 (87.5%)		71 (68.3%)	16 (57.1%)	
COPD preop, n (%)						
No	20 (80.0%)	6 (75.0%)	>0.999	88 (84.6%)	27 (96.4%)	0.121
Yes	5 (20.0%)	2 (25.0%)		16 (15.4%)	1 (3.6%)	
Renal disease preop, n (%)						
No	13 (52.0%)	3 (37.5%)	0.688	86 (82.7%)	22 (78.6%)	0.616
Yes	12 (48.0%)	5 (62.5%)		18 (17.3%)	6 (21.4%)	
Congestive heart failure preop, n (%)						
No	11 (44.0%)	0 (0%)	0.031	79 (76.0%)	19 (67.9%)	0.384
Yes	14 (56.0%)	8 (100.0%)		25 (24.0%)	9 (32.1%)	

Table 2. Comparison of Demographics Between Preop MR Severity Grade by Each Aortic Valve Replacement Type

	TAVR				SAVR				P value TAVR vs SAVR
	Total N=33	Mild (N=25)	Moderate/ severe (N=8)	Moderate/ severe vs mild P-value	Total N=132	Mild (N=104)	Moderate/ severe (N=28)	Moderate/ severe vs mild P-value	
Ejection fraction (EF) preop									
N	33	25	8		127	101	26		
Missing	--	--	--		5	3	2		
Median	55 (50.0, 63.0)	60 (53.2, 63.0)	42.5 (28.9, 60.0)	0.144	55 (45.0, 60.0)	55 (45.0, 60.0)	55 (40.0, 58.0)	0.26	0.332
Left ventricular internal diameter end diastolic: LVIDd									
N	32	24	8		91	70	21		
Missing	1	1	--		41	34	7		
Median (IQR)	4.7 (4.1, 5.3)	4.6 (4.2, 5.3)	5.0 (4.0, 6.1)	0.528	4.8 (4.2, 5.6)	4.7 (4.2, 5.6)	5.0 (4.8, 5.5)	0.186	0.502
Left ventricular internal diameter end systolic: LVIDs									
N	22	17	5		73	56	17		
Missing	11	8	3		59	48	11		
Median (IQR)	3.1 (2.3, 4.4)	2.8 (2.3, 3.6)	4.4 (3.3, 5.3)	0.085	3.1 (2.6, 3.8)	3.0 (2.5, 3.7)	3.7 (2.9, 4.2)	0.075	0.528
End diastolic volume: EDV(MOD-bp)									
N	15	9	6		21	15	6		
Missing	18	16	2		111	89	22		
Median (IQR)	122.2 (89.0, 159.5)	116.7 (105.9, 143.0)	165.3 (86.9, 210.2)	0.263	102.8 (81.0, 149.0)	100.1 (63.6, 156.1)	124.1 (92.5, 149.0)	0.413	0.369
End systolic volume: ESV(MOD-bp)									
N	13	8	5		20	14	6		
Missing	20	17	3		112	90	22		
Median (IQR)	51.6 (28.8, 66.9)	45.3 (28.4, 63.5)	73.9 (28.8, 151.7)	0.421	49.1 (31.7, 84.4)	39.5 (13.5, 81.8)	66.9 (49.1, 109.3)	0.173	>0.999
Stroke volume - left ventricular outflow tract (LVOT)									
N	25	20	5		43	34	9		
Missing	8	5	3		89	70	19		
Median (IQR)	71.1 (62.5, 87.5)	70.1 (59.4, 98.6)	72.3 (68.5, 75.1)	0.812	73.3 (55.0, 82.9)	75.1 (57.2, 83.6)	57.1 (54.1, 73.3)	0.124	0.665
Stroke volume (MOD-bp)									
N	7	4	3		12	6	6		
Missing	26	21	5		120	98	22		
Median (IQR)	66.9 (58.1, 77.4)	71.5 (60.0, 82.0)	58.5 (58.1, 77.4)	0.86	49.7 (45.2, 70.3)	56.8 (49.6, 74.2)	47.5 (43.4, 66.4)	0.575	0.083
Left ventricular outflow tract diameter									
N	31	25	6		95	75	20		
Missing	2	--	2		37	29	8		
Median	2.0 (2.0, 2.2)	2.1 (2.0, 2.2)	2.0 (1.9, 2.3)	0.822	2.0 (1.9, 2.2)	2.0 (1.9, 2.2)	2.0 (2.0, 2.2)	0.393	0.896
Left atrium dimension									
N	28	21	7		89	69	20		
Missing	5	4	1		43	35	8		
Median (IQR)	4.6 (3.9, 4.9)	4.5 (3.9, 4.8)	4.8 (4.4, 5.3)	0.09	4.0 (3.6, 4.5)	4.0 (3.6, 4.4)	4.2 (3.7, 4.6)	0.423	0.004

Table 3 continued

	TAVR				SAVR				P value TAVR vs SAVR
	Total N=33	Mild (N=25)	Moderate/ severe (N=8)	Moderate/ severe vs mild P-value	Total N=132	Mild (N=104)	Moderate/ severe (N=28)	Moderate/ severe vs mild P-value	
Mitral valve A point									
N	26	21	5		74	59	15		
Missing	7	4	3		58	45	13		
Median (IQR)	112.2 (89.5, 124.4)	113.2 (94.3, 133.4)	96.7 (83.2, 107.0)	0.216	85.2 (70.2, 106.0)	85.3 (73.3, 108.8)	82.9 (58.7, 102.1)	0.221	0.004
Mitral valve E point									
N	32	24	8		93	73	20		
Missing	1	1	--		39	31	8		
Median (IQR)	105.8 (93.1, 125.0)	101.8 (76.9, 107.8)	140.2 (117.9, 153.3)	0.001	89.4 (69.1, 113.0)	83.4 (64.1, 107.9)	103 (92.5, 118.5)	0.017	0.013
Mitral valve EIA									
N	26	21	5		73	58	15		
Missing	7	4	3		59	46	13		
Median (IQR)	0.9 (0.7, 1.5)	0.8 (0.7, 1.2)	1.7 (1.5, 1.9)	0.006	0.9 (0.7, 1.2)	0.9 (0.7, 1.1)	1.2 (0.9, 1.7)	0.004	0.896

Table 3. Preop Echocardiographic Results for Each Preop MR Severity Group by Aortic Valve Replacement Type

(echocardiographic values) were compared. There were no significant differences in pre-operative comorbidities or operative characteristics examined between improved and not improved MR groups.

Discussion

We observed MR improvement in the majority of patients with preop moderate-severe MR, consistent with findings by Kaczorowski et al. and Barbanti et al. (12, 15). Additionally, studies such as those by Waisbren et al. and Wyler et al. (5, 16) highlight variability in MR improvement, emphasizing the influence of functional versus degenerative MR.

The observed MR improvement, regardless of etiology, is particularly relevant for elderly patients with degenerative AS and MR, where double-valve surgery poses higher risks. The absence of significant echocardiographic parameter changes between SAVR and TAVR suggests that MR improvement is not solely dependent on procedural choice. Furthermore, preoperative factors such as atrial fibrillation, pulmonary hypertension, congestive heart failure, diabetes, hypertension, chronic kidney disease, and COPD have been identified as predictors of MR persistence, though these were not statistically significant in our study (15).

Regarding survival analysis between TAVR and SAVR, multiple factors can play a role in mortality rate, including age at procedure, concomitant surgery such as CABG or mitral valve replacement, and presence of endocarditis at the time of procedure.

In practice, changes in MR grade are influenced by various patient risk factors, including age at surgery, presence of comorbidities, and concomitant procedures. Regarding the differences in progression of preoperative MR grade between moderate/severe and mild groups in both procedures, we hypothesized that the types of MR damage (degenerative versus functional) may play at role in these discrepancies. Previous studies showed that etiology of MR may or may not predict reduction in MR. Specifically, there was no statistically significant difference in the proportion of patients that had leaflet abnormalities, mitral annular calcification, or any structural MV disease between groups of patients that experienced improvement in MR compared to those that did not (12). Further investigation and stratification of degenerative versus physiological MR may reveal the underlying pathophysiological cause of these changes, regardless of types of aortic valve replacements involve.

Limitations of this study including lack of echocardiographic measurements postoperatively

	TAVR			SAVR		
	Mild (N=25)	Moderate/severe (N=8)	P-value	Mild (N=104)	Moderate/severe (N=28)	P-value
All-cause mortality, n (%)			> 0.999			0.002
Yes	15 (60.0%)	5 (62.5%)		64 (61.5%)	26 (92.9%)	
No	10 (40.0%)	3 (37.5%)		40 (38.5%)	2 (7.1%)	
Procedure-related mortality, n (%)			>0.999			0.723
N	15	5		64	26	
Yes	2 (13.3%)	1 (20.0%)		7 (10.9%)	4 (15.4%)	
No	13 (86.7%)	4 (80.0%)		57 (89.1%)	22 (84.6%)	

Table 4. Mortality Outcomes for Each Preop MR Severity Group by Aortic Valve Replacement Type

	TAVR		SAVR		
	Mild MR preoperative (N=24)	Moderate/severe MR preoperative (N=8)	Mild MR preoperative (N=93)	Moderate/severe MR preoperative - AVR (N=12)	Moderate/severe MR preoperative - AVR + MVR (N=3)
MR severity 1-year postoperative					
No change	19 (79.2%)	2 (25.0%)	62 (66.7%)	1 (8.3%)	0 (0%)
Improved	5 (20.8%)	5 (62.5%)	22 (23.6%)	11 (91.7%)	3 (100%)
Worsened	0 (0%)	1 (12.5%)	9 (9.7%)	0 (0%)	0 (0%)

AVR: Aortic Valve Replacement MVR: Mitral Valve Replacement

Table 5. Changes in MR Severity from Preoperative to 1 Year Postoperative for TAVR and SAVR Groups

and the non-aligned follow up timeline between the two procedures. While there is a specific guideline for TAVR echocardiogram follow-up at 30 days, 6 months, and 1 year, patients with SAVR should follow up at 1 year for biological valve replacement and 5 years for mechanical valve replacement. These discrepancy makes it challenging to obtain echocardiographic data at 1 year postop for every patient. Other limitations include small sample size and the retrospective nature of the analysis. Additionally, information such as etiologies of MR damage and mortality are not always documented on patient chart and can be challenging to identify during chart review.

Our findings highlight the challenges in predicting which patients will experience improvement in MR following aortic valve replacement. These results underscore the need for a prospective evaluation of the clinical benefits of addressing moderate MR at the time of aortic valve intervention. Future studies may focus on prospective analysis that identifies and controls a specific preoperative factor (comorbidities or echocardiographic data) that leads to MR grade improvement, ultimately optimizing patient outcomes. Furthermore, increasing follow-up timeline may give a deeper insight into how MR severity evolves over time.

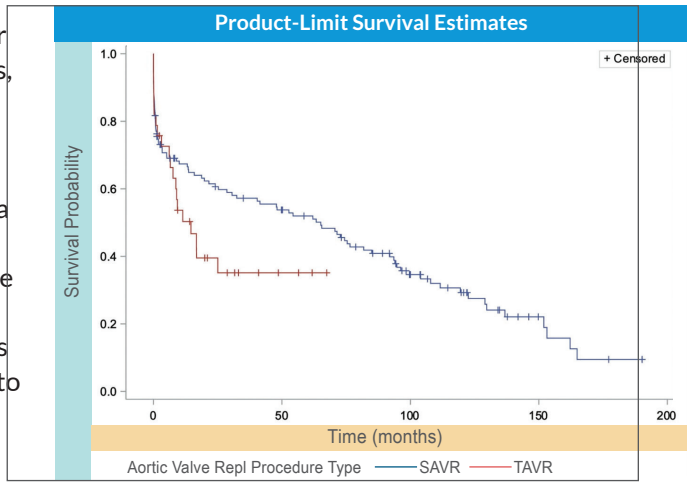

Figure 1. Kaplan-Meier curve for SAVR and TAVR groups

Conclusion

Patients with moderate/severe MR who underwent SAVR or TAVR predominantly experienced improved MR grade at 1 year postoperatively, whereas those with mild MR were likely to remain unchanged. Comparison of echocardiographic changes from preop to 1-year postop, including LVEF, LVIDd, LVIDs,

	TAVR			SAVR			P-value TAVR vs SAVR
Changes from preop to 1-year postop	Total	Mild	Moderate/ severe	Total	Mild	Moderate/ severe	
	N=33	(N=25)	(N=8)	N=132	(N=104)	(N=28)	
EF							
Median (IQR)	0 (-5.0, 5.0)	0 (-5.0, 7.3)	0 (-5.0, 3.1)	0 (-5.0, 10.0)	0 (0, 10.0)	-18.2 (-25.0, -11.3)	0.495
LVIDd							
Median (IQR)	0.14 (-0.34, 0.31)	0.13 (-0.51, 0.30)	0.31 (-0.34, 0.58)	0.01 (-0.53, 0.58)	0.11 (-0.53, 0.58)	-0.37 (-0.37, -0.37)	0.948
LVIDs							
Median (IQR)	0.24 (-0.43, 1.1)	0.46 (-0.14, 1.1)	-0.21 (-0.51, 0.10)	-0.34 (-0.54, 0.16)	-0.24 (-0.54,0.16)	-0.4 (-0.40, -0.40)	0.131
LVOT diameter							
Median (IQR)	-0.1 (-0.19, -0.05)	-0.1 (-0.22, -0.05)	-0.05 (-0.19, 0.06)	-0.06 (-0.39, 0.16)	-0.06 (-0.39, 0.16)	(Missing data)	0.838
LAd							
Median (IQR)	-0.25 (-0.53, 0.30)	-0.16 (-0.34, 0.22)	-0.59 (-0.72, 0.38)	0.16 (-0.05, 0.47)	0.29 (-0.04, 0.72)	-1.4 (-1.4, -1.4)	0.262
Mitral valve E/A							
Median (IQR)	0.1 (-0.08, 0.28)	0.1 (-0.08, 0.28)	(Missing data)	-0.001 (-0.34, 0.13)	0.03 (-0.26, 0.13)	-0.37 (-0.37, -0.37)	0.469

Table 6. Change in Preop and 1 Year Postop Echocardiographic Results for Each Preop MR Severity Group by Aortic Valve Replacement Type

LVOTd, and LAd, shows no significant difference between SAVR and TAVR groups. There were no significant differences in pre-operative comorbidities or operative characteristics examined between improved and not improved MR groups. Our findings provide valuable insights for decision-making in performing TAVR and SAVR on patients with AS and MR, particularly those with moderate to severe MR and multiple comorbidities, who may face higher risks from concomitant valve replacement procedures.

Disclosures

All authors declare no conflicts of interest relevant to this study. This research was supported by funding from the Geisinger Commonwealth School of Medicine under CRF number 23-027. The study was approved by the Institutional Review Board (IRB) under protocol number 2023-0995.

Acknowledgments

We sincerely thank Dr. Neil Mehta and Dr. Jeffrey Shuhaiber for their invaluable guidance and expertise in advising on study design and refining data variables. We would also like to extend our gratitude to Andrea Hattenberger for her assistance in data extraction and Idorenyin Udoeyo for her essential role in data analysis, which greatly contributed to the interpretation of these findings. Additionally, we acknowledge Geisinger Commonwealth School of Medicine for generously providing the research funding necessary to complete this project.

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