Attitude after a mild aortic valve lesion during rheumatic mitral valve surgery

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Objective: We evaluated whether rheumatic aortic valve disease of mild degree should be treated in patients undergoing mitral valve surgery.

Methods: From 1992 to 2010, 197 patients (aged 52 [19-82] years, male:female = 60:137) who had rheumatic mitral valve disease and mild aortic valve disease were enrolled. The aortic valve was untreated in 114 patients (no treatment group), repaired in 40 patients (aortic valvuloplasty group), and replaced in 43 patients (aortic valve replacement group).

Results: Operative mortality occurred in 4 patients (2.0%). There were no differences in early mortality and postoperative complications among the 3 groups. Overall survival at 5, 10, and 15 years was 96.3%, 92.1%, and 85.7%, respectively. In the no treatment group, progression-free survival in significant aortic valve disease at 5, 10, and 15 years was 98.7%, 91.3%, and 81.1%, respectively. This was not superior in the aortic valvuloplasty group (85.9%, 77.6%, and 69.8%, respectively) than in the no treatment group. Freedom from aortic valve disease was lower in patients with aortic stenosis than in those with aortic regurgitation in univariate and multivariable analyses ($P < .001$). Reoperation was performed in 19 patients, including 2 aortic valve reoperations. Aortic valve–related event-free survival was similar among the 3 groups.

Conclusions: Mild aortic valve disease in patients undergoing rheumatic mitral valve surgery could be left untreated, because preventive aortic valve operation does not result in better clinical and echocardiographic outcomes. (J Thorac Cardiovasc Surg 2014;147:1540-6)

Aortic valve pathology is frequently found in patients undergoing mitral valve surgery for rheumatic mitral valve disease. Although current guidelines do not indicate preventive surgery for mild degenerative aortic valve disease (AVD) during other cardiac surgery, previous studies demonstrated that rheumatic valve disease exhibited a pathology of both mitral and aortic valves in more than one third of patients,[1-3] and the rheumatic valvulitis tended to involve both valves in almost all patients during a 20-year follow-up.[2,3] However, few studies demonstrated long-term changes of untreated aortic valve lesions after mitral valve surgery.[4-6] In addition, whether treating mild AVD by repair or replacement is beneficial has not been elucidated. The aim of this study was to evaluate whether rheumatic AVD of mild degree should be treated concomitantly at the time of mitral valve surgery.

MATERIALS AND METHODS

Patient Characteristics

The study protocol was reviewed by the institutional review board and approved as a minimal risk retrospective study (Approval Number: H-1204-023-403) that did not require individual consent based on the institutional guidelines for waiving consent. From January 1992 to December 2010, 197 patients (52 [19-82] years, male:female = 60:137) who underwent first-time cardiac surgery for rheumatic mitral valve disease combined with mild AVD were enrolled in the present study. Patients exhibiting degenerative pathology were excluded. Patients were divided into 3 groups: the aortic valve was left untreated (no treatment [NT] group, n = 114) and concomitant aortic valve repair (aortic valvuloplasty [AVP] group, n = 40) or aortic valve replacement (AVR group, n = 43). Demographic data of the study patients were similar among the 3 groups (Table 1). Echocardiographic data showed that more patients in the AVP and AVR groups had stenotic aortic valve pathology compared with the NT group ($P = .001$). However, the aortic valve area and mean transvalvular pressure gradient in patients who had stenotic aortic valves were similar among the 3 groups (Table 1).

Surgical Procedures

All operations were performed under a routine aorto-bicaval cannulation, moderate hypothermia, and cold cardioplegic arrest via a median sternotomy. Performing aortic valve intervention was at the discretion of the operating surgeon. The mitral valve was repaired in 18.8% of patients (37/197). The AVP and NT groups underwent mitral valvuloplasty more frequently than the AVR group ($P = .002$). Techniques of aortic valve repair included slicing and decalcification of thickened and calcified aortic valve leaflets (n = 6), commissurotomy (n = 2), or both (n = 32). In the 43 patients in the AVR group, bileaflet mechanical valves were used in 39 patients and bovine pericardial bioprostheses were inserted in 4 patients. Concomitant procedures, such as tricuspid valve operation and arrhythmia surgery, were performed in 81.2% of patients (160/197). A greater number of patients in the NT group underwent arrhythmia surgery than in the AVR group ($P = .034$). The cardiopulmonary bypass and aortic crossclamp times were 161 (46-309) minutes and 109 (21-231) minutes, respectively. These were longer in the AVR group than in the NT and AVP groups (Table 2).

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Abbreviations and Acronyms
AVD = aortic valve disease
AVP = aortic valvuloplasty
AVR = aortic valve replacement
CI = confidence interval
HR = hazard ratio
NT = no treatment

Echocardiographic Evaluation

An initial postoperative echocardiographic evaluation was performed before discharge in all but 2 patients who died early after surgery. Follow-up echocardiograms were performed at the discretion of the operating surgeon or referring physicians during the follow-up. At least 1 echocardiogram was performed in 94% of the survivors (181/193). The last follow-up echocardiogram was performed at 95 (3-221) months after the surgery. In patients exhibiting normal left ventricular function, the mean pressure gradient calculated with the Bernoulli equation by continuous-wave Doppler echocardiography was used to define the grade of aortic stenosis (mild, <25 mm Hg; moderate, 25-40 mm Hg; severe, >40 mm Hg). In patients with left ventricular dysfunction, the aortic valve area was used to define the severity of aortic stenosis (mild, >1.5 cm^2; moderate, 1.0-1.5 cm^2; severe, <1.0 cm^2). The degree of aortic regurgitation was graded in accordance with previous guidelines.[7-9]

Evaluation of Early and Long-Term Clinical Outcomes

Operative mortality was defined as death within 30 days or during the same hospitalization period after the surgery. Patients underwent a regular postoperative follow-up through the outpatient clinic at 3- or 4-month intervals and were contacted by telephone for confirmation of their condition if the last clinic visit was not conducted at the scheduled time. Follow-up was completed in 96.4% of the survivors (186/193), with a follow-up duration of 114 (1-242) months. Cardiac death was defined as any death related to cardiac events, including sudden death during the follow-up. Aortic valve–related mortality was defined as cardiac death that originated from aortic valve–related complications or sudden death. Valve-related complications were recorded according to the previous guidelines.[10] Significant native AVD was defined as moderate or greater degree of AVD in the NT and AVP groups. Significant prosthetic AVD included significant transvalvular pressure gradient (mean transvalvular gradient ≥25 mm Hg) across the prosthetic aortic valve and moderate or greater degree of aortic regurgitation of the bioprosthetic valve in the AVR group. Aortic valve–related events include the following: (1) aortic valve–related mortality, including sudden death; (2) composite of thrombosis, embolism, and bleeding; (3) significant native or prosthetic AVD; (4) subsequent aortic valve operation; and (5) native or prosthetic aortic valve endocarditis.

Statistical Analysis

Statistical analyses were performed with SPSS version 12 (SPSS Inc, Chicago, Ill) and SAS version 9.1 (SAS Institute Inc, Cary, NC). Data were expressed as mean ± standard deviation, median with ranges, or proportions. Comparison among the 3 groups was performed with the chi-square test or the Fisher exact test for categoric variables and analysis of variance test for continuous variables. Post hoc comparison was performed using the Bonferroni method. Survival was estimated using the Kaplan–Meier method, and comparisons among groups were performed with the log-rank test or Cox regression analysis. The Cox proportional hazard model was adopted for analysis of risk factors for time-related events. The proportional hazard property was tested using the restricted cubic spline for continuous variables and the Cox proportional hazards model with an interaction term with time for categoric variables.[11,12] All independent variables in the Cox regressions met the proportional hazards assumption. Multicollinearity was controlled using backward stepwise regression. Variables with a P value of less than .2 were entered into multivariable analyses.

RESULTS

Early Clinical and Echocardiographic Results

The operative mortality rate was 2.0% (4/197 patients). Postoperative morbidities included low cardiac output syndrome (n = 11, 5.6%), postoperative bleeding requiring reoperation (n = 6, 3.0%), stroke (n = 3, 1.5%), and acute renal failure (n = 3, 1.5%). There were no differences in operative mortality and postoperative complications among the 3 groups (Table 3). Postoperative echocardiography was performed at 8 ± 4 days after the surgery in all but 2 patients (1 patient in the NT group and 1 patient in the AVR group). In the 113 patients in the NT group who underwent postoperative echocardiography, the grade of the aortic valve lesion improved to less than mild degree (mean pressure gradient <10 mm Hg and no significant regurgitation jet) in 16 patients (14.2%), remained the same in 96 patients (85.0%), and became aggravated to moderate degree in 1 patient (0.9%). In the AVP group, more patients had improved AVD compared with the NT group (P = .006); the degree of AVD improved in 15 patients (37.5%), remained the same in 24 patients (60%), and became aggravated in 1 patient (2.5%). In the AVR group, early complications associated with AVR, such as prosthetic valve endocarditis, paravalvular leak, and significant transvalvular pressure gradient, were not found.

Long-Term Clinical Outcomes

Among the 193 survivors, late death occurred in 12 patients, including 4 cardiac deaths. Causes in cardiac death were heart failure associated with tricuspid regurgitation (n = 2), prosthetic mitral valve failure (n = 1), and sudden death (n = 1).

The overall survival at 5, 10, and 15 years was 96.3%, 92.1%, and 85.7%, respectively. Survival in cardiac death at 5, 10, and 15 years was 97.9%, 96.0%, and 94.9%, respectively. There were no differences in the overall survival and survival in cardiac death among the 3 groups (P = .401 and .633, respectively). Age-adjusted multivariable analysis revealed that hypertension and combined tricuspid valve disease were risk factors for the overall survival (P = .001 and .025, respectively). Hypertension was also a significant risk factor for long-term cardiac death (P = .002, Table 4).

Progression of Native Aortic Valve Disease in the No Treatment and Aortic Valve Repair Groups

In the NT group, significant AVD occurred in 8 patients. Progression-free survival in significant AVD at 5, 10, and 15

TABLE 1. Preoperative characteristics and echocardiographic data of study patients

	Total (n = 197)	NT group (n = 114)	AVP group (n = 40)	AVR group (n = 43)	*P* value
Age (y)	52 (19-82)	54 (24-82)	52 (25-76)	49 (19-71)	.183
Male/female	60/137	30/84	11/29	19/24	.086
Body surface area (m^2)	1.56 ± 0.15	1.54 ± 0.15	1.56 ± 0.17	1.60 ± 0.13	.096
Risk factors, n (%)					
Smoking	30 (15.2%)	18 (15.8%)	5 (12.5%)	7 (16.3%)	.863
Hypertension	10 (5.1%)	4 (3.5%)	1 (2.5%)	5 (11.6%)	.760
Diabetes mellitus	11 (5.6%)	8 (7.0%)	1 (2.5%)	2 (4.7%)	.267
Overweight (BMI ≥25 kg/m^2)	24 (12.2%)	13 (11.4%)	6 (15.0%)	5 (11.6%)	.584
History of stroke	32 (16.2%)	19 (16.7%)	8 (20.0%)	5 (11.6%)	.576
NYHA class ≥3	78 (39.6%)	48 (42.1%)	17 (42.5%)	13 (30.2%)	.365
Atrial fibrillation	172 (87.3%)	97 (85.1%)	34 (85.0%)	41 (95.3%)	.201
Echocardiographic data					
LVEF (%)	54.9 ± 9.3	54.5 ± 9.2	55.3 ± 8.2	55.6 ± 10.9	.754
Left atrial size (mm)	60.9 ± 14.9	62.4 ± 16.9	58.3 ± 10.8	59.6 ± 12.4	.284
Systolic PAP (mm Hg)	47.1 ± 16.7	49.5 ± 17.6	45.3 ± 16.6	42.0 ± 13.0	.065
Data of patients with AS					
No. of patients (%)	30 (15.2%)	8 (7.0%)	11 (27.5%)	11 (25.6%)	.001
AVA (cm^2)	1.55 ± 0.29	1.57 ± 0.16	1.55 ± 0.34	1.52 ± 0.41	.977
Mean PG (mm Hg)	15.4 ± 4.3	14.4 ± 2.2	16.2 ± 5.1	16.2 ± 5.1	.699

AS, Aortic stenosis; *AVA*, aortic valve area; *AVP*, aortic valvuloplasty; *AVR*, aortic valve replacement; *BMI*, body mass index; *LVEF*, left ventricular ejection fraction; *NT*, no treatment; *NYHA*, New York Heart Association; *PAP*, pulmonary artery pressure; *PG*, pressure gradient.

years was 98.7%, 91.3%, and 81.1%, respectively. In the AVP group, significant AVD occurred in 8 patients. Progression-free survival in significant AVD at 5, 10, and 15 years was 85.9%, 77.6%, and 69.8%, respectively. A univariate analysis revealed that the progression-free survival in significant AVD was lower in the AVP group than in the NT group ($P = .027$). However, this difference disappeared in the multivariable Cox proportional hazard analysis ($P = .569$, Figure 1).

Progression of Prosthetic Aortic Valve Disease

In the AVR group, a significant transvalvular pressure gradient was found in 7 patients who had mechanical aortic valves, even though the opening of the prosthetic valve leaflets was not restricted. In those patients, the estimated effective orifice area index presented by manufacturers was greater than 0.9 cm^2/m^2, and mean transvalvular pressure gradients ranged from 8 to 18 mm Hg at the early postoperative echocardiograms. No patient had moderate or greater degree of prosthetic valve regurgitation. Freedom from significant AVD at 5, 10, and 15 years was 90.4%, 85.9%, and 76.0%, respectively. The AVD-free survival in the AVR group was between that in the NT and AVP groups without statistically significant difference compared with the other 2 groups (Figure 2).

Progression of Aortic Valve Disease According to Type of Aortic Valve Lesion

In 30 patients who had aortic stenosis, 1 patient in the NT group died early after surgery. Significant AVD occurred in 12 of the 29 survivors (3/7 patients in the NT group, 5/11 patients in the AVP group, and 4/11 patients in the AVR group). Five-, 10-, and 15-year freedom rates from significant AVD in patients with aortic stenosis were

TABLE 2. Operative data of the study patients

	Total (n = 197)	NT group (n = 114)	AVP group (n = 40)	AVR group (n = 43)	*P* value
Mitral valve surgery, n (%)					
Mitral valve repair	37 (18.8%)	23 (20.2%)*	13 (32.5%)*	1 (2.3%)	.002
Mitral valve replacement	160 (81.2%)	91 (79.8%)	27 (67.5%)	42 (97.7%)	
Concomitant procedures, n (%)	160 (81.2%)	96 (84.2%)	35 (87.5%)	29 (67.4%)	
Tricuspid valve surgery	68 (34.5%)	38 (33.3%)	14 (35.0%)	16 (37.2%)	.899
Arrhythmia surgery	112 (56.9%)	71 (62.3%)*	24 (60.0%)	17 (39.5%)	.034
Others	3 (1.5%)	2 (1.8%)	1 (2.5%)	0 (0%)	.927
CPB time (min)	161 (46-309)	153 (46-277)*	166 (116-300)	195 (86-309)	<.001
ACC time (min)	109 (21-231)	100 (21-209)*,†	122 (75-201)	150 (61-231)	<.001

ACC, Aortic crossclamp; *AVP*, aortic valvuloplasty; *AVR*, aortic valve replacement; *CPB*, cardiopulmonary bypass; *NT*, no treatment. *Variables with significant difference compared with the AVR group in post hoc comparison. †Variable with significant difference compared with the AVP group in post hoc comparison.

TABLE 3. Operative mortality and postoperative complications

	Total (n = 197)	NT group (n = 114)	AVP group (n = 40)	AVR group (n = 43)	*P* value
Mortality, n (%)	4 (2.0%)	3 (2.6%)	0 (0%)	1 (2.3%)	.730
Morbidities, n (%)					
LCOS	11 (5.6%)	7 (6.1%)	1 (2.5%)	3 (7.0%)	.989
New-onset atrial fibrillation	6 (3.0%)	3 (2.6%)	3 (7.5%)	0 (0%)	.671
Bleeding reoperation	6 (3.0%)	3 (2.6%)	1 (2.5%)	2 (4.7%)	.555
IABP insertion	5 (2.5%)	3 (2.6%)	1 (2.5%)	1 (2.3%)	.913
Respiratory complication	3 (1.5%)	1 (0.9%)	1 (2.5%)	1 (2.3%)	.442
Stroke	3 (1.5%)	2 (1.8%)	0 (0%)	1 (2.3%)	.954
Acute renal failure	3 (1.5%)	3 (2.6%)	0 (0%)	0 (0%)	.173
Mediastinitis	1 (0.5%)	1 (0.9%)	0 (0%)	0 (0%)	.434

AVP, Aortic valvuloplasty; *AVR*, aortic valve replacement; *IABP*, intra-aortic balloon pump; *LCOS*, low cardiac output syndrome; *NT*, no treatment.

80.4%, 56.6%, and 32.4%, respectively, without intergroup difference ($P = .963$).

In 167 patients who had aortic regurgitation, early mortality occurred in 3 patients (2 in the NT group and 1 in the AVR group). During the follow-up, significant AVD occurred in 11 of the 164 survivors (5/104 patients in the NT group, 3/29 patients in AVP group, and 3/31 patients in the AVR group). Five-, 10-, and 15-year freedom rates from significant AVD in patients with aortic regurgitation were 96.9%, 94.5%, and 86.4%, respectively.

Freedom from significant AVD was lower in patients with aortic stenosis than in those with aortic regurgitation in univariate ($P < .001$) and multicollinearity-controlled multivariable analyses ($P < .001$; hazard ratio [HR], 7.533; 95% confidence interval [CI], 3.273-17.335) (Table 5; Figures 3 and 4). When subgroup analyses were performed separately in each group, stenotic aortic valve pathology remained the only significant predictor for aggravation of untreated aortic valve ($P = .001$; HR, 9.736; 95% CI, 2.399-39.510) and repaired aortic valve ($P = .050$; HR, 4.212; 95% CI, 1.001-17.728). In the AVR group, however, there was no statistically significant risk factor associated with the progression of prosthetic AVD.

Long-Term Aortic Valve–Related Events

Subsequent aortic valve operation was performed in only 2 patients. One patient in the NT group underwent AVR 9 years after the index operation. The primary indication of reoperation was severe tricuspid valve regurgitation. Intraoperative findings revealed retracted aortic valve cusp, and it was replaced to prevent future reoperation, although the grade of AVD remained mild. The other patient in the AVR group underwent aortic valve re-replacement because the subaortic pannus was causing severe transvalvular pressure gradient 16 years after the surgery. Another 17 patients underwent cardiac reoperations other than aortic valve surgery during the follow-up period. Mitral valve surgery was performed in 12 patients (redo-mitral valve replacement in 7 patients, mitral valve replacement after initial mitral valve repair in 4 patients, and mitral valve re-repair in 1 patient), and a tricuspid valve operation was performed in 8 patients for severe tricuspid regurgitation, including 2 patients who underwent tricuspid annuloplasty at the initial operation. Three patients underwent both mitral and tricuspid valve surgery.

TABLE 4. Multivariable risk factor analysis for overall survival and survival in cardiac death

Risk factors for overall mortality	Hazard ratio (95% CI)	*P* value
Age (y)	1.107 (1.053-1.164)	<.001
Hypertension	8.149 (2.372-27.999)	.001
Concomitant TR surgery	3.570 (1.178-10.816)	.025
Risk factors for cardiac death	**Hazard ratio (95% CI)**	***P* value**
Age (y)	1.093 (1.017-1.174)	.016
Hypertension	11.613 (2.484-54.296)	.002

CI, Confidence interval; *TR*, tricuspid regurgitation.

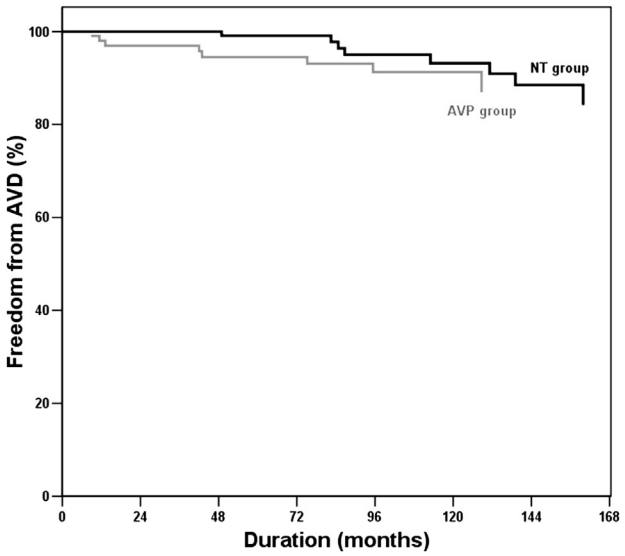

FIGURE 1. Risk factor–adjusted curve by Cox proportional hazard model for freedom from progression of AVD in the NT and AVP groups. *AVD*, Aortic valve disease; *AVP*, aortic valvuloplasty; *NT*, no treatment.

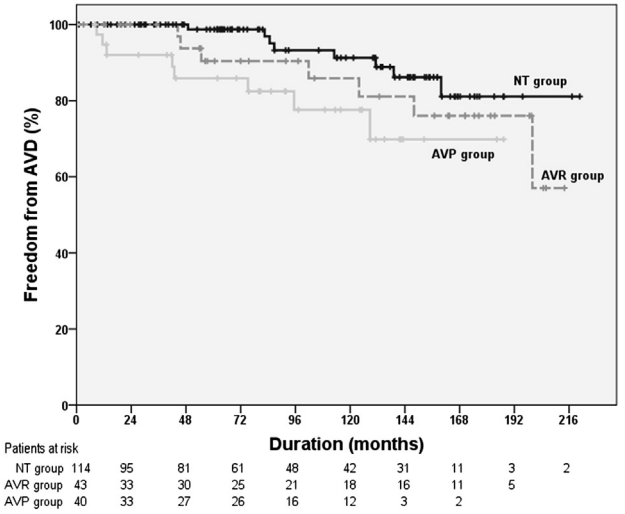

FIGURE 2. Freedom from progression of native and prosthetic AVD. Post hoc comparison revealed no significant difference in freedom from progression of AVD between the AVR group and the NT and AVP groups. *AVD*, Aortic valve disease; *AVP*, aortic valvuloplasty; *AVR*, aortic valve replacement; *NT*, no treatment.

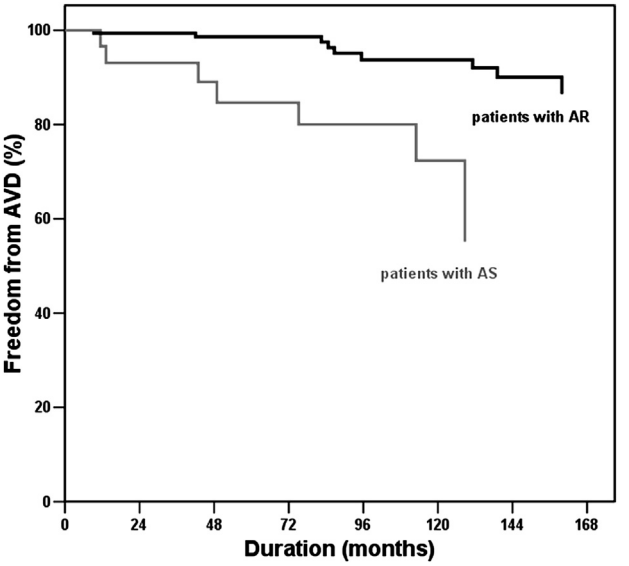

FIGURE 3. Risk factor–adjusted curve by Cox proportional hazard model for freedom from progression of AVD according to aortic valve pathology; patients with AS versus patients with AR. *AR*, Aortic regurgitation; *AS*, aortic stenosis; *AVD*, aortic valve disease.

Although 2 patients had infective endocarditis and 11 patients required readmission to control congestive heart failure, these were not related to the AVD. Aortic valve–related event-free survival at 5, 10, and 15 years was 94.2%, 87.3%, and 79.6%, respectively, without intergroup difference ($P = .154$, Figure 5).

DISCUSSION

This study demonstrated 3 main findings. First, mild rheumatic aortic stenosis frequently progresses in patients undergoing rheumatic mitral valve surgery, regardless of initial treatment strategy. Second, mild aortic valve regurgitation in patients undergoing rheumatic mitral valve surgery rarely progresses up to 20 years after the surgery. Third, concomitant aortic valve intervention, including conservative valve repair and replacement, does not result in better outcomes in terms of freedom from significant AVD, regardless of the type of aortic valve lesion.

TABLE 5. Multivariable risk factor analysis for progression of aortic valve disease in the no treatment and aortic valvuloplasty groups

	Univariate analysis	Multivariable analysis	
Variables	*P* value	Hazard ratio (95% CI)	*P* value
Repair of the aortic valve	.032	—	NS
Female sex	.130	—	NS
Body surface area, m^2	.052	—	NS
Stenotic aortic valve	<.001	5.645 (1.717-18.556)	.004
Arrhythmia surgery	.185	—	NS

CI, Confidence interval; *NS*, not significant.

Combined AVD is a frequently found pathology in up to one third of patients with rheumatic mitral valve disease.[1-3] Although previous studies demonstrated that rheumatic valve disease involved both aortic and mitral valves in almost all patients during a 20-year follow-up,[2,3] few

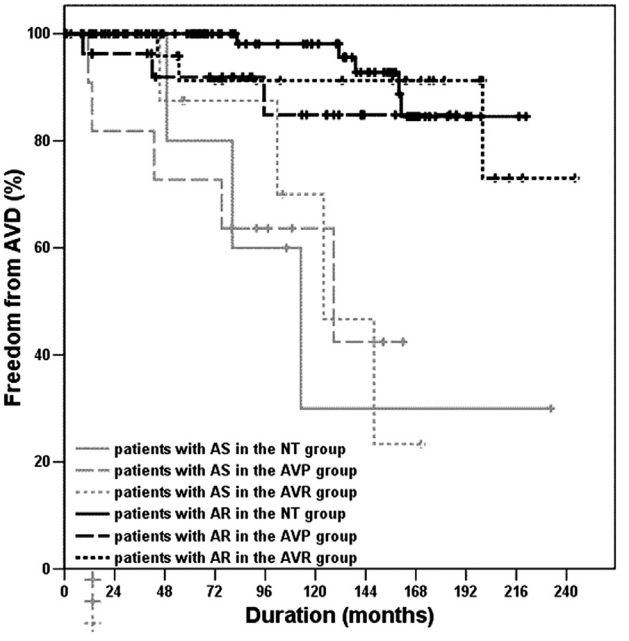

FIGURE 4. Survival curves for freedom from progression of AVD according to treatment strategy (NT, AVP, and AVR groups) and aortic valve pathology (AS and AR). *AR*, Aortic regurgitation; *AS*, aortic stenosis; *AVD*, aortic valve disease; *AVP*, aortic valvuloplasty; *AVR*, aortic valve replacement; *NT*, no treatment.

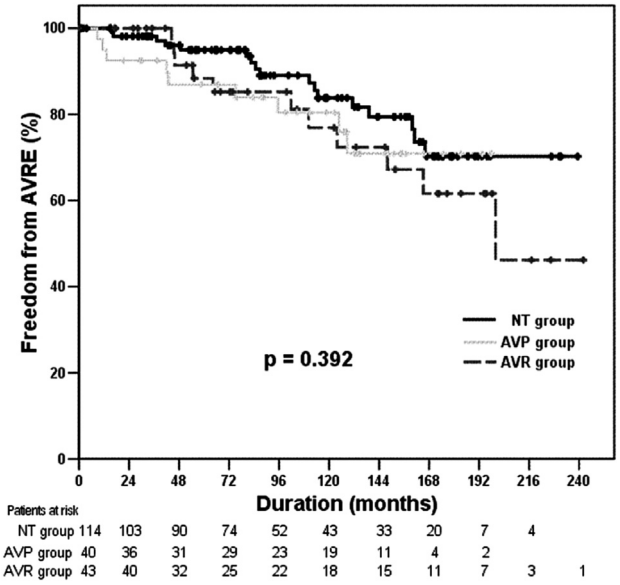

FIGURE 5. Freedom from aortic valve–related event in the NT, AVP, and AVR groups. *AVP*, Aortic valvuloplasty; *AVR*, aortic valve replacement; *AVRE*, aortic valve–related event; *NT*, no treatment.

reports have demonstrated the fate of untouched AVD after mitral valve surgery.[4-6] Another issue is the efficacy of aortic valve repair in such a patient population. Few studies have demonstrated the results of aortic valve repair in patients with predominant rheumatic mitral valve disease.[13,14] A previous study demonstrated that freedom from reoperation after aortic valve repair for mild-to-moderate AVD was 75% at 13 years after surgery.[13] The authors suggested that aortic valve repair could be applied successfully in mild-to-moderate rheumatic AVD accompanying a predominant mitral lesion. However, another study demonstrated that conservative operations for rheumatic AVD did not seem appropriate because the freedom from reoperation of the aortic valve was only 25.3% at a 22-year follow-up period after surgery.[14] The authors suggested that if an adequate mitral valve repair was achieved, an attitude toward ignoring the aortic lesion might be adopted.[14]

Although there have been reports demonstrating the changes in AVD after mitral valve surgery for rheumatic mitral valve disease, no study has directly compared the clinical outcomes based on the treatment strategy for combined AVD. In the present study, we compared long-term clinical outcomes and echocardiographic results after surgery for rheumatic mitral valve disease, according to the treatment strategies for combined AVD. The addition of aortic valve repair or replacement for mild AVD did not affect the early clinical outcomes, although patients in the AVR group underwent a longer operation with lengthier cardiopulmonary bypass and aortic crossclamp times than the other 2 groups. Also, the long-term survival and freedom from cardiac death were not different among the groups. The multivariable analysis revealed that hypertension and combined tricuspid valve surgery were associated with the long-term mortality, perhaps because 68 patients who underwent concomitant tricuspid valve surgery were sicker than the others, were significantly older (55 [34-81] years vs 49 [19-82] years), and more frequently had diabetes (7/68 patients vs 4/125 patients). However, we did not describe detailed data on this issue because they were beyond the scope of the present study.

Up to 20 years follow-up after the surgery, untreated aortic regurgitation rarely progressed to moderate or higher grades, regardless of the initial treatment option. On the contrary, aortic stenosis frequently progressed to moderate or more degree. These results are in agreement with a previous study that showed the progression of native AVD in patients with aortic stenosis.[5,15] In addition, we compared the changes of an aortic valve that was left untreated with those of a repaired aortic valve. Conservative aortic valve repair for both aortic stenosis and regurgitation did not reduce the occurrence of significant AVD and aortic valve–related events during the follow-up period, even though patients in the AVP group experienced an improved degree of AVD early after surgery. Although there are more aggressive techniques to repair the aortic valve with favorable long-term results, it is doubtful whether those should be applied to mild aortic valve lesions.[16,17] Likewise, although patients in the AVR group did not have aortic valve–related complications early after the surgery, AVR did not result in better aortic valve–related event-free survivals for up to 20 years of follow-up. In 7 patients, transvalvular pressure gradient increased during the follow-up. In those patients, the effective orifice area index was appropriate and the mean transvalvular pressure gradient was insignificant at the early postoperative period. Formation of a subaortic pannus, which is a frequently found nonstructural valve dysfunction after AVR, might be the main reason for the increased transvalvular pressure gradient, because echocardiographic findings confirmed that the opening of the prosthetic valve cusps was not restricted.

Study Limitations

First, the present study was a retrospective observational study at a single institution. Second, selection bias of the retrospective study might affect the results of the present study, although all patients in the 3 groups had mild AVD, and aortic valve area and mean pressure gradient in patients with stenotic aortic valve lesion were similar among the 3 groups. Third, the numbers of patients in the AVP and AVR groups might be relatively small to achieve statistically significant differences and draw a definite conclusion. Fourth, generalization of our results to young patients in developing countries may be limited, because the old age of the study patients was a characteristic of the rheumatic patients with a stabilized disease process in developed countries.

CONCLUSIONS

When patients undergoing rheumatic mitral valve surgery have a mild degree of AVD, the aortic valve can be left untreated regardless of the type of aortic valve lesion, because conservative valve repair and valve replacement do not improve the long-term clinical outcomes. However, echocardiographic follow-up might be necessary in patients with stenotic AVD, because it tends to progress more easily than regurgitant AVD.

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