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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Disclosures: Authors have nothing to disclose with regard to commercial support.
Received for publication Feb 18, 2013; revisions received April 21, 2013; accepted for publication May 10, 2013; available ahead of print July 24, 2013.

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0022-5223/$36.00

http://dx.doi.org/10.1016/j.jtcvs.2013.05.040

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