Mitral Valve Repair in Rheumatic Patients

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ABSTRACT

Background: There is controversy regarding the role of reparative techniques for rheumatic-mitral valve disease. We have analyzed the late results of mitral valve repair in a group of patients with rheumatic mitral valve insufficiency.

Methods: From March 1980 to December 1997, 201 patients with rheumatic fever underwent mitral valve repair at the Heart Institute, Hospital das Clínicas, Medical School, University of São Paulo. The mean age of patients was 26.9 ± 15.4 years, with 59.7% of the patients being female. Other diagnoses were present in 67.7% of patients; the most common was tricuspid regurgitation (31.3%). Mitral valve repair techniques included: 1) Carpentier ring annuloplasty in 75 patients (37.3%); 2) posterior annuloplasty with bovine patch in 68 patients (33.8%); 3) posterior segmental annuloplasty in 16 patients (7.9%); 4) quadrangular resection of the posterior leaflet with ring plication in 11 patients (5.5%); 5) partial resection of the anterior leaflet in 6 patients (3%); 6) De Vega's annuloplasty in 6 patients (3%); 7) Kay's annuloplasty in 5 patients (2.5%); 8) Reed's annuloplasty in 4 patients (2%); and 9) miscellaneous techniques in 10 patients (4.9%). Combined techniques were used in 94 patients (46.8%), the most frequent of which was chordal shortening (48 patients, 23.9%). Other non-mitral cardiac procedures were performed in 113 patients (56.2%). Actuarial survival and event-free curves (Kaplan-Meier method) were compared by linear regression analysis.

Results: The in-hospital mortality rate was 2.0% (four patients). The causes of death were multiorgan failure in two patients and low cardiac output in the other two patients. In the late postoperative period, 83.9% of the patients were in New York Heart Association (NYHA) functional class 1. The actuarial survival was $93.9\% \pm 1.9\%$ at a mean of 125 months. Twenty-three patients were reoperated in the postoperative period at a mean interval of 35.7 months. Survival free from reoperation was $43.3\% \pm 13.7\%$ at 125 months. When analyzing the patients according to age, actuarial survival was $91.3\% \pm 3.8\%$ in the group of patients younger than 16 years (Group 1), compared with $95.6\% \pm 2.7\%$ in the group older than 16 years (Group 2), with a statistically significant difference of $p < 0.0001$. Survival free from reoperation was $50.8\% \pm 16.9\%$ in Group 1 and $47.0\% \pm 14.9\%$ in Group 2 ($p < 0.0001$).

Conclusions: Late results obtained with mitral valve repair for rheumatic mitral valve insufficiency were satisfactory and exceeded those reported for mitral valve replacement in the same population.

INTRODUCTION

Mitral valve repair in patients with rheumatic fever has been discussed extensively in the literature and the results of repair procedures are conflicting among different publications [Merendino 1957, Reed 1974, Bernal 1993, Pomerantzeff 1994]. Mitral valve repair in the setting of rheumatic change can be technically difficult to perform and the late results are adversely affected by new episodes of acute rheumatic inflammation. In our experience, neither challenge invalidates surgical repair in cases involving rheumatic fever because, in general, the results are still better than those obtained with mitral valve replacement.

The purpose of this report is to present the early and late results obtained in a series of patients who underwent repair for rheumatic mitral valve insufficiency at the Heart Institute, Hospital das Clínicas, Medical School, University of São Paulo, Brazil.

Table 1. Echocardiographic Data of Fatal Cases in Group 1*

Patient	Age (y)	LA (mm)	LVDD (mm)	EF (%)
1	14	70	67	36
2†	13	51	78	47
3†	8	55	65	58

*LA indicates left atrial size; LVDD, left ventricular diastolic diameter; EF, ejection fraction.

† Acute phase of rheumatic fever.

MATERIALS AND METHODS

From March 1980 to December 1997, 201 patients with a diagnosis of rheumatic fever and mitral valve insufficiency underwent mitral valve repair. Patient ages ranged from 5 to 75 years with a mean age of 26.9 ± 15.4 years. One hundred and twenty patients (59.7%) were female and 81 (40.3%) were male. One hundred and thirty-six (67.7%) patients had a combined diagnosis: 59 patients (29.4%) had mitral valve and aortic lesions, 38 (18.9%) had mitral-tricuspid lesions, 34 (16.9%) mitral-aortic-tricuspid lesions and 5 (2.5%) had concomitant coronary artery disease. Eighty-three patients (41.3%) presented in NYHA functional class IV, 102 patients (50.7%) in functional class III, and 16 patients (8%) in functional class II.

The techniques used in the mitral valve repair were: 1) Carpentier's ring annuloplasty in 75 patients (37.3%), 2) posterior annuloplasty with bovine pericardial patch in 68 patients (33.8%), 3) posterior segmental annuloplasty in 16 patients (7.9%), 4) quadrangular resection of the posterior leaflet with ring plication in 11 patients (5.5%), 5) partial resection of the anterior leaflet in 6 patients (3%), 6) De Vega's annuloplasty in 6 patients (3%), 7) Kay's annuloplasty in 5 patients (2.5%), 8) Reed's annuloplasty in 4 patients (2%), 9) a double "U" suture technique in 3 patients (1.5%), 10) a posterior leaflet extension in 3 patients (1.5%), 11) posterior leaflet resection in 2 patients (1%), 12) Puig-Massana's ring annuloplasty in 1 patient (0.5%), and 13) fissure suture in 1 patient (0.5%). The "U" suture technique consists of opposing U-shaped mattress sutures supported by pledgets inserted in the posterior area of the mitral valve ring. On average, eight pairs of opposing double U stitches are used.

One hundred and thirteen procedures were carried out in 94 patients (46.8%). Some patients underwent more than one procedure. Forty-eight chordal shortening procedures (23.9%) were carried out as an adjunct to another repair. Other accessory techniques included 45 multiple papillotomy procedures (22.3%), 7 posterior cusp debridement procedures (3.5%), 3 anterior cusp wedge resections (1.5%), 3 short chordae removal procedures (1.5%), 3 leaflet repairs with bovine pericardium (1.5%), 2 papillary muscle shortening procedures (1.0%), 1 anterior leaflet plication (0.5%), and 1 chordal transposition (0.5%).

One hundred and forty-four non-mitral procedures were carried out during the same type of operation in 113 patients (56.2%). The procedures were: 49 (24.4%) aortic-
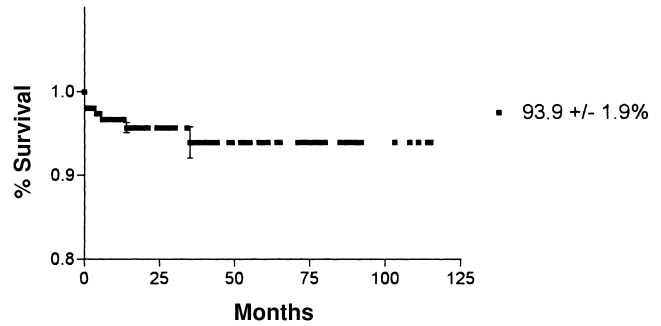

Figure 1. Actuarial survival curve.

valve replacements, 65 (32.3%) tricuspid-valve repairs, 14 (0.7%) aortic-valve reconstructions, 9 (4.4%) aortic-valve commissurotomies, 5 (3.5%) myocardial revascularizations, and 2 (1.0%) tricuspid-valve replacements.

Postoperative follow-up was obtained by contact with the patients through scheduled hospital visits, telephone calls, or questionnaires sent by mail. Data are presented according to the revised rules for data and nomenclature presentation [Edmunds 1996]. Two groups were analyzed according to age ranges. Group 1 consisted of 68 patients (33.8%) age 16 years and younger, and Group 2 consisted of 133 patients (66.2%) older than 16 years of age.

Actuarial survival, free of complications, was calculated by Kaplan-Meier method [Anderson 1974] and compared by linear regression analysis. Linear rates of events are expressed in percentage per patient-year. Statistical analyses of data were by Mann-Whitney test and McNemar test.

RESULTS

There were 4 hospital deaths in 201 cases (a mortality rate of 2.0%). The causes of death included multiple organ failure in two patients and low cardiac output in two patients. Three deaths (4.4%) were in Group 1 and were all in NYHA functional class IV, preoperatively. Two of these three patients were operated on during the acute phase of rheumatic fever and required combined procedures (two aortic-valve repair surgeries and one tricuspid-valve repair). Echocardiographic data for these patients are shown in Table 1 (⊙). Only one patient (0.8%), a 75-year-old patient who underwent mitral valve commissurotomy, died in Group 2. The difference between the two groups regarding preoperative functional class was statistically significant. Twenty-nine patients (42.6%) in Group 1 were in NYHA functional class IV compared with 54 class IV patients (40.6%) in Group 2 (p < 0.0001). There were no cases of early postoperative endocarditis or thromboembolism.

One hundred eight patients (89.6%) completed the follow-up period. Mean postoperative follow-up was 5.1 years in Group 1 and 5.6 years in Group 2. In the late postoperative period, 161 patients (83.9%) were in NYHA functional class I. In Group 1, 87.3% of patients were in functional class I and 12.7% were in functional class III. In Group 2,
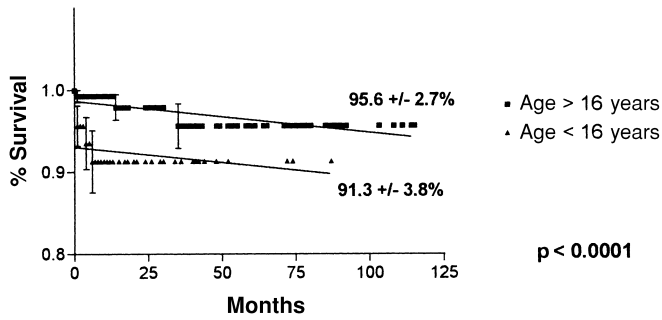
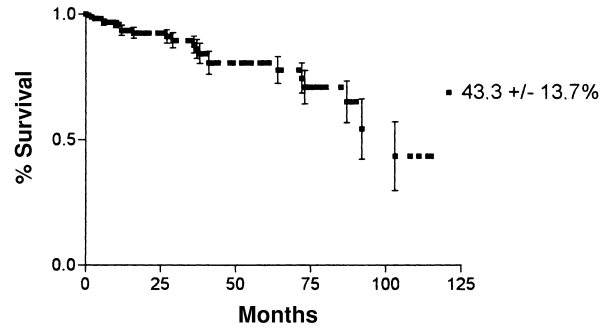Figure 2. Linear regression—actuarial survival curves.

Figure 3. Survival free from reoperation.

80.8% of patients were in functional class I, 12.3% were in class II, and 6.9% were in class III during late follow-up.

Actuarial survival was 93.9% ± 1.9% at a mean of 125 months (p < 0.0001) (Figure 1, ◉) including 91.3% ± 3.8% in Group 1 at 100 months and 95.6% ± 2.7% in Group 2 at 125 months (p < 0.0001) (Figure 2, ◉). There were four late deaths (0.7% per patient-year). In Group 1 there were two late deaths (1.1% per patient-year), 1 death due to heart failure and the other due to multiple organ failure in a patient who had undergone subsequent mitral valve replacement. In Group 2 there were two late deaths (0.6% per patient-year), both due to congestive heart failure.

Twenty-three patients underwent late reoperation (4.3% per patient-year). The survival rate, free from reoperation after initial mitral valve repair, was 43.3% ± 3.7% at a mean of 125 months (Figure 3, ◉). In Group 1, there were 10 reoperations (5.5% per patient-year) with a mean interval of 20 months between procedures and an actuarial survival rate, free from reoperation, of 50.8% ± 16.9% at a mean of 125 months. In Group 2, there were 13 reoperations (3.7% per patient-year) at a mean interval of 48 months with an actuarial survival rate, free from reoperation, of 47.0% ± 14.9% at a mean of 100 months (p < 0.0001) (Figure 4, ◉). There were no cases of late endocarditis. There was one event of thromboembolism in the late postoperative period of a Group 2 patient, yielding a linear rate of 0.3% per patient-year.

DISCUSSION

Mitral valve repair is universally accepted as superior to mitral valve replacement for non-rheumatic valvular pathology. In myxomatous degeneration, the surgical techniques and benefits of mitral valve repair have been clearly established. However, in rheumatic fever, mitral valve repair is technically more difficult, and the benefit obtained is often altered by new episodes of rheumatic inflammation [Anderson 1974, Antunes 1994, Edmunds 1996]. Furthermore, the results depend on the valve status at the time of the initial repair procedure. The more impaired or deformed the valve, the less long-term benefit is obtained. For replacement operations, bioprosthetic calcification remains a problem, particularly in the younger age ranges, and anticoagulation is often difficult due to

patients in low socio-economic areas living far away and not having access to medical centers that carry out control anticoagulation tests.

In our series of mitral valve repair for rheumatic mitral valve insufficiency, we were able to accomplish surgical reconstruction with a low in-hospital mortality rate of 2.0%. This is well below the mortality rates achieved with mitral valve replacement as reported in the literature [Borkon 1986, Braile 1991, Cosgrove 1995, Pomerantzeff 1997]. The higher mortality rate (4.4%) in our younger Group 1 patients is most likely due to their clinical condition at the time of hospitalization, which is consistent with other reports from the literature [Kumar 1995]; these acute rheumatic patients had impaired myocardial function and cardiac cachexia. When preoperative functional classes were compared, 42.9% of Group 1 patients were in functional class IV compared with 40.6% of Group 2 patients, a statistically significant difference. The three perioperative deaths were Group 1 patients who had all presented in functional class IV, and two had been in the acute phase of rheumatic fever. As previously reported, the surgical mortality is higher when operative intervention is required for medical failure during the acute phase of rheumatic fever [Pomerantzeff 1992]. Even in these patients, repair yields better results than replacement because it preserves the subvalvar mechanism and permits better postoperative ventricular function [Pomerantzeff 1993].

Actuarial survival following surgical repair of mitral valve insufficiency was 93.9% ± 1.9% at a mean of 125 months, similar to the results reported by Duran et al.
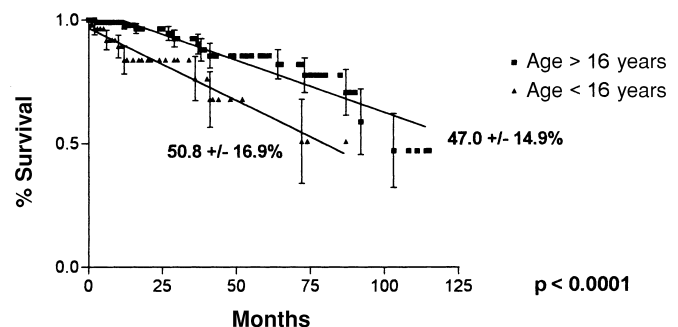

Figure 4. Linear regression—survival free from reoperation.

[Duran 1988]. Group 2 survival (95.6% ± 2.7%) was significantly higher (p < 0.0001) than in Group 1 (91.3% ± 3.8%).

The incidence of reoperation in the postoperative period was 11.4% at 10 years (14.7% in Group 1 compared with 9.8% in Group 2 [p < 0.0001]). This result is better than the 30% reoperation rate reported by Antunes et al. [Antunes 1983], the 27.2% reoperation rate reported by Skoularigis et al. [Skoularigis 1994], and the 21.2% reoperation rate reported by Chauvaud et al. [Chauvaud 1986] in young rheumatic patients. The causes of surgical failure appear to be incorrect indications for surgery, the use of inadequate techniques, and the progression of rheumatic fever [Bernal 1996, Gillinov 1997] — the latter related to the younger group. However, the results of surgeries for mitral valve replacement in young rheumatic patients have been shown to be worse regarding both mortality and recovery when compared with surgeries for mitral valve repair [Gerola 1990, Lucchese 1992, Gometza 1996].

In our experience, a variety of surgical repair techniques can be applied successfully to patients with rheumatic mitral valve insufficiency. Long-term results are satisfactory and are superior to mitral valve replacement, particularly in the younger-aged population. It is our recommendation that mitral valve repair be performed whenever possible in this group of patients.

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