Mitral Valve Repair. Quadrangular Resection of the Posterior Leaflet in Patients with Myxomatous Degeneration

Pablo Maria Alberto Pomerantzeff, Carlos Manuel de Almeida Brandão, Eduardo Giusti Rossi, LuísFrancisco Cardoso, Flávio Tarasoutchi, Max Grinberg, Noedir Antonio Groppo Stolf, Luiz Boro Puig, Geraldo Verginelli, Adib Domingos Jatene

São Paulo, SP - Brazil

Objective – *To analyze the immediate and late results of mitral valve repair with quadrangular resection of the posterior leaflet without the use of a prosthetic ring annuloplasty.*

Methods - *Using this technique, 118 patients with mitral valve prolapse who underwent mitral repair from January '84 through December '96 were studied. Age ranged from 30 to 86 (mean = 59.1±11.8) years and 62.7% were males. An associated surgery was performed in 22% of the patients, and coronary artery bypass graft was the most frequently performed surgery (15 patients – 12.7%). In 20 (16.9%) patients other associated techniques of mitral valve repair were used and shortening of elongated chordae tendineae was the most frequent one (6 patients).*

Results – *Immediate mortality was 0.9% (one patient). Long-term rates for thromboembolism, endocarditis, re-operation and death in the late postoperative period were 0.4%, 0.4%, 1.7% and 2.2% patients/year, respectively. The actuarial curve of survival was 83.8±8.6% over 12 years; survival free from re-operation was 91.8±4.3%, free from endocarditis was 99.2±0.8% and free from thromboembolism was 99.2±0.8%. In the late postoperative period, 93.8% of the patients were in functional class 1 (NYHA), with a complete follow-up in 89.7% of the patients.*

Conclusion – *Patients with mitral valve prolapse who undergo mitral valve repair using this technique have a satisfactory prognosis over 12 years.*

Keywords: mitral valve repair, valvular surgery, mitral annuloplasty

Instituto do Coração of the Hospital das Clínicas – FMUSP
Mailing address: Pablo M. A. Pomerantzeff – Incor - Av. Dr. Enéas C. Aguiar, 44 - 05403-000 - São Paulo, SP Brazil.
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Merendino et al [1] were the first to propose plication of the mitral ring for correction of mitral regurgitation secondary to rheumatic disease. Other authors have used the same technique in myxomatous degeneration or fibroelastic disease, with good results [2-5].

Most surgeons use this technique associated with the implant of a prosthetic ring. We performed a quadrangular resection of the posterior leaflet without annuloplasty with a prosthetic ring in 118 patients, and decided to analyze the late follow-up of this technique.

Methods

At the Instituto do Coração of the São Paulo University in Brazil, from January '84 through December '96, 118 patients underwent mitral valve repair with quadrangular resection of the posterior leaflet for correction of mitral regurgitation secondary to prolapse with myxomatous degeneration.

Seventy-four patients (62.7%) were males, and 44 (37.3%) were females. Age ranged from 30 to 86 years (mean age = 59.1±11.8). Twenty-five patients (21.2%) had associated problems: coronary artery disease in 15 (12.7%), tricuspid regurgitation in 5 (4.2%), aortic regurgitation in 3 (2.5%), aortic stenosis in 2 (1.7%) and an atrial septal defect in 2 (1.7%).

The technique used for mitral valve repair was the quadrangular resection of the posterior leaflet, segmental annuloplasty and border-to-border suture of the leaflet, without the use of a prosthetic ring. A careful examination of the valve during surgery was essential. Plication of the ring was performed so as to eliminate tension on the suture of the leaflet. Associated techniques were used in 20 patients (table I). The method used for myocardial protection was filtrated crystalloid cardioplegia (St. Thomas solution).

Twenty-six (22%) patients underwent associated surgeries, and myocardial revascularization was the most frequently performed (15 patients – 12.7%). Other procedures were: tricuspid valve repair in 6 (5.1%), aortic valve

Table 1- Techniques associated with mitral valve repair

Associated techniques	Patients	%
Shortening of chordae tendineae	6	5.1
Calcium resection	6	5.1
Plication of the anterior leaflet	3	2.5
Sliding of the posterior leaflet	3	2.5
Resection of the anterior leaflet	1	0.9
Shortening of the papillary muscles	1	0.9
Resection of short chordae tendineae	1	0.9
Total	20	16.9

replacement in 3 (2.5%), plasty of the atrial septum in 2 (1.7%) and aortic commissurotomy in one (0.9%).

Thirty-two patients (27.1%) were in preoperative functional class IV (NYHA), 68 (57.6%) in functional class III and 18 (15.3%) in functional class II.

Follow-up data were obtained during medical appointments, interviews by telephone or by questionnaire.

Data are presented according to the recommendations of the literature [6]. Survival curves and event-free survival curves were calculated according to the Kaplan-Meier method [7]. Survival rates are presented as percentages of patients per year (% patient/year).

Results

There was one death in the hospital (0.9%). This patient, on the 27th post-operative day, presented with acute mitral regurgitation and underwent mitral valve replacement. He died seven days later of low cardiac output. Postoperative complications happened in 8 patients: one (0.9%) had a cerebral stroke, one (0.9%) endocarditis, three (2.5%) low cardiac output, one (0.9%) pneumonia, one (0.9%) acute renal failure and one (0.9%) acute mitral regurgitation.

Follow-up was complete in 89.7% of the patients. Three patients were re-operated upon in the late follow-up due to mitral regurgitation, with a mean interval of 25 months. There were five late deaths (4.3%), and the main cause of death was congestive heart failure in two patients (1.7%). Other causes of death were: arrhythmias in one (0.9%), stroke in one (0.9%) colon carcinoma in one (0.9%). Survival was 83.8±8.6% over 12 years (fig. 1). Survival free from re-operation was 91.8±4.3% (fig. 2), free from endocarditis 99.2±0.8% (fig. 3) and free from thromboembolism 99.2±0.8% (fig. 4).

In the late postoperative follow-up, 93.8% of the patients were in functional class I (NYHA).

Discussion

Reconstruction of the mitral valve in myxomatous degeneration with ruptured or elongated cords of the posterior leaflet is possible in the majority of patients. Good results of mitral valve repair depend on good knowledge of the valve anatomy and detailed examination of the valve during surgery, aiming at detecting areas of prolapse, sites of retraction and jet lesions on the left atrium wall.

The technique of plication of the segment of the leaflet without support was described in 1960 [8]. Triangular or quadrangular resections of these leaflet segments have been proposed [9,10]. We believe that quadrangular resection of the posterior leaflet must always be associated with a segmental

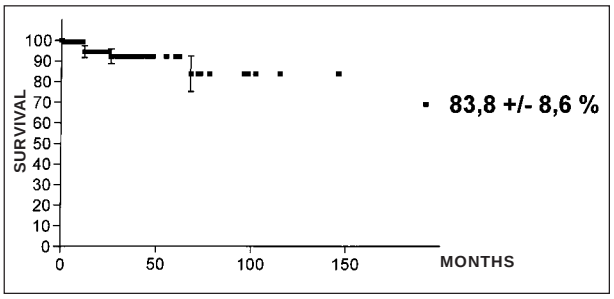

Fig. 1 – Survival actuarial curve during a 12-year follow-up in patients with myxomatous degeneration who underwent mitral valve repair.

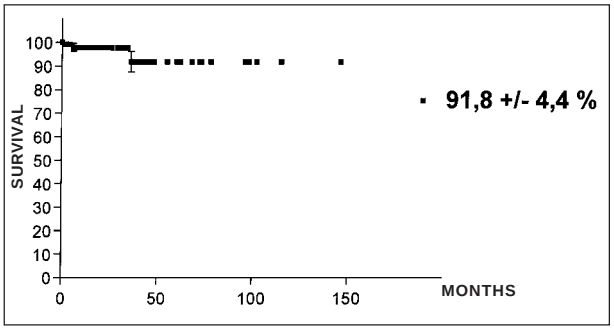

Fig. 2 – Survival free from re-operation.

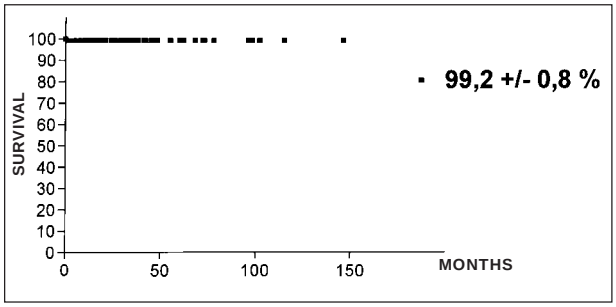

Fig. 3 – Survival free from endocarditis.

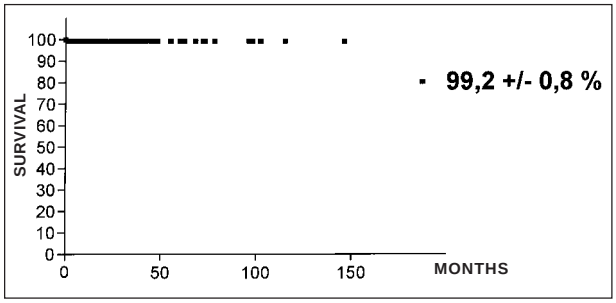

Fig. 4 – Survival free from thromboembolism.

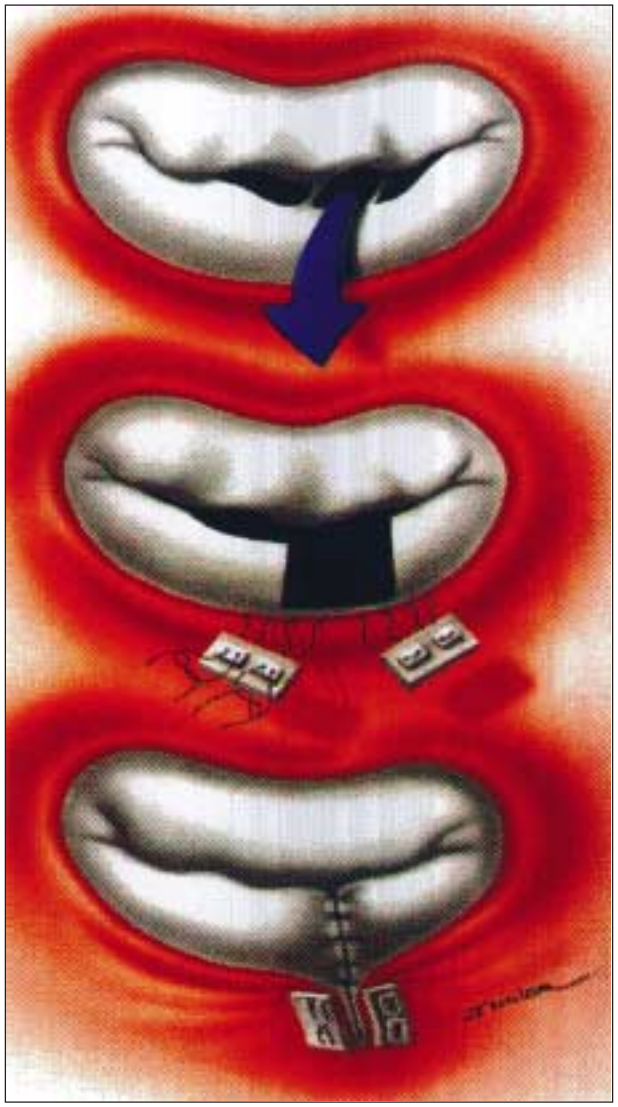

Fig. 5 – Quadrangular resection of the posterior leaflet.

annuloplasty of the corresponding area of the ring in order to eliminate the tension on the suture line of the leaflet. We have used separate stitches on the suture of the borders of the leaflet and reinforced the annuloplasty with Teflon. Since 1994, we have been performing the so-called "double-Teflon annuloplasty" (annuloplasty with two bars of Teflon and pledgets) (fig. 5).

Hospital mortality was low (0.9%). Mortality from mitral valve repair due to myxomatous degeneration has a lower mortality in relation to the whole group of mitral valve repair [11].

Although several surgeons think that a prosthetic ring should be applied to all mitral valve repairs [12,13], these rings may be a problem [14]. In some cases, systolic anterior movement of the mitral valve (SAM) with obstruction of the left ventricular outflow tract has been reported [15]. Doppler echocardiography during the late follow-up of these patients did not detect SAM in any of them.

Alvarez et al [16], in a series of 155 patients in whom a prosthetic ring was used in only 3%, described a hospital mortality of 3.9% and survival free from re-operation in 84.9% during a 15-year follow-up. This is similar to the survival of our patients, as well as to that reported in other series [4,12] (83.8% over 12 years).

The incidence of thromboembolism was low (0.9%), similar to that which has been described in the literature by others, and lower than that observed in valve replacement [17]. Similar findings have been observed in endocarditis.

Late follow-up has been very favorable. Survival free from re-operation after 12 years is 91.8%, which is higher than that observed with replacement of the valve by a biological prosthesis.

We feel that the most important point is the detailed examination of the valve during surgery. Valves with severe myxomatous degeneration should not be preserved; however, the great majority of the operated patients had only a few elongated or ruptured chordae tendineae, with moderate degeneration of the rest of the valve, which favors valvuloplasty.

We believe that these good results allow us to continue to use this technique to treat mitral regurgitation secondary to myxomatous degeneration with prolapse of the posterior leaflet.

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