

# Aortic valve preservation surgery in elderly patients with aortic stenosis

## Cirurgia de preservação da valva aórtica em idosos com estenose aórtica

Rodrigo Coelho SEGALOTE<sup>1</sup>, Pablo Maria Alberto POMERANTZEFF<sup>2</sup>, Carlos Manuel de Almeida BRANDÃO<sup>3</sup>, Noedir Antônio Groppo STOLF<sup>4</sup>

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### Abstract

**Objective:** The aim of this study was to investigate early and late results of the aortic valve preservation surgery (AVPS) through reshaping, decalcification and commissurotomy of the aortic valve (AV) in aortic stenosis (AS) in elderly patients.

**Methods:** Thirty-two patients with isolated AS, older than 65 years-old who underwent aortic valve repair were studied retrospectively at InCor FMUSP. Early and late results and echocardiographic follow-up were investigated. Outpatient follow-up was performed by outpatient record review and interview by phone contact. Actuarial and event-free survival analysis were performed using the Kaplan-Meier method.

**Results:** Four patients (15.4%) presented AV stenosis. Five patients developed moderate heart failure and two developed severe heart failure. Decalcification, commissurotomy and rough-hewing were performed in 28, 20 and 16 patients, respectively. Nine patients presented severe postoperative complications (28.1%). Two hospital deaths due to pneumonia/sepsis and five late deaths had occurred. Postoperative NYHA functional status were 70.5%, 17.6%, 5.8% and 5.8% for functional classes I, II, III and IV, respectively. Actuarial eight-year survival rate was  $66.9 \pm 12.1\%$ . Eight-year free thromboembolism and endocarditis rate were  $90.9 \pm 8.7\%$  and 100%, respectively.

**Conclusion:** Aortic valve preservation surgery in elderly with AS presented as a procedure with low morbidity and mortality and presented an eight-year acceptable survival

rate and functional class improvement among the studied series of patients.

**Descriptors:** Aortic valve stenosis. Aortic valve/surgery. Heart valve diseases/surgery. Aged. Treatment outcome.

### Resumo

**Objetivo:** O objetivo deste estudo é apresentar resultados imediatos e tardios da cirurgia de preservação da valva aórtica por meio do desbastamento, descalcificação e commissurotomia da valva aórtica na estenose aórtica em idosos.

**Métodos:** Estudo realizado no InCor FMUSP, no qual foram operados 32 pacientes > 65 anos com estenose aórtica isolada, submetidos a plastia da valva aórtica. Observamos os resultados imediatos e tardios, o seguimento ecocardiográfico e clínico; sendo este último pela revisão das consultas ambulatoriais e entrevista por contato telefônico. A sobrevida atuarial e livre de eventos foi calculada pelo método de Kaplan-Meier.

**Resultados:** Quatro (15,4%) pacientes apresentaram reestenose da valva aórtica. Cinco pacientes evoluíram com insuficiência aórtica moderada e dois com insuficiência aórtica grave. Os procedimentos realizados na cirurgia foram: descalcificação, commissurotomia e desbastamento em 28, 20 e 16 pacientes, respectivamente. As complicações pós-operatórias graves totalizaram nove (28,1%) pacientes. Ocorreram dois óbitos hospitalares, estes por sepse causada por pneumonia hospitalar, e cinco tardios. A classe funcional pós-operatória,

1. Specialist by BSCVS. (Cardiac surgeon of the INC-MS and the Clementino Fraga Filho University Hospital-UFRJ).
2. Associated Professor of the Cardiopneumology Department of the FMUSP. (Director of the Surgical Unit of Valve Diseases of the InCor – HC – FMUSP).
3. PhD in Medicine by FMUSP. (Assistant Physician – Surgical Division – InCor – HC – FMUSP – Collaborator Professor).
4. Titular Professor of the Discipline of Cardiovascular Surgery of FMUSP. (Director of the Surgical Division of the InCor – HC – FMUSP).

This study was carried out at the Heart Institute of the Clinics Hospital

of the Faculty of Medicine - University of São Paulo. Address: Rua Dr. Enéas de Carvalho Aguiar, nº 44. São Paulo - SP.

### Correspondence address:

Rodrigo Coelho Segalote. Rua dois de dezembro, 66, apto 1004. Flamengo, Rio de Janeiro - RJ. CEP 22220-040.

Tels. 21 2225-3985 / 21 8275-2828.

E-mail: segalote@yahoo.com.br

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segundo a NYHA, em ordem decrescente foi de 70,5%, 17,6%, 5,8% e 5,8%; para as classes funcionais I, II, III e IV, respectivamente. A sobrevida actuarial foi de 66,9%  $\pm$  12,1% em oito anos. A curva livre de tromboembolismo e endocardite foram de 90,9%  $\pm$  8,7% e 100% em oito anos, respectivamente.

**Conclusão:** A cirurgia de preservação da valva aórtica em idosos com estenose aórtica nesta série de pacientes mostrou-

se com baixa morbidade e mortalidade, taxa de sobrevida satisfatória em oito anos e melhora da classe funcional no seguimento apresentado.

**Descritores:** Estenose da valva aórtica. Valva aórtica/cirurgia. Doenças das valvas cardíacas/cirurgia. Idoso. Resultado de tratamento.

## INTRODUCTION

Aortic stenosis (AS) is a disease that is relatively prevalent in the elderly (2.9%) [1]. According to the IBGE 1991/2000, the frequency has been increasing year after year. The number of people over 75 years old has reached 1.6% in a country with more than 146 million inhabitants [2]. Thus, the interest in this pathology in this age group has also increased.

There is currently a strong tendency of surgeons to try their best to preserve the valve apparatus, because there is still no ideal valve replacement. In Brazil, Neves et al. and, more recently, Mendonça et al., published their experiences with reconstructive surgery of the aortic valve, particularly for aortic insufficiency, with good results in both studies [3-4].

Although durable, mechanical prostheses have problems with anticoagulation, such as thromboembolism, bleeding, and infection [5]. Along with the mechanical prostheses, the bioprostheses also have limitations, largely because of their deterioration after the seventh year after the implant [6].

Among the procedures for the preservation of the aortic valve (AV), percutaneous aortic valvuloplasty is the least invasive, but it failed to reproduce the results of actual valve replacement [7].

Finally, there is AV preservation surgery using cardiopulmonary bypass, which can be performed using ultrasonic decalcification, though this method is not recommended because of its limiting side effects, including postoperative aortic insufficiency and early restenosis [8-9]. Another method of performing this preservation surgery is manual valve repair using decalcification, reshaping and AV commissurotomy. This method is the focus of this study.

This procedure has been recommended for the elderly, for patients with a small aortic annulus and/or contraindication to anticoagulation; due to the higher surgical risk for the former group, and increased mortality in surgery for aortic annulus enlargement in the latter group [10-13].

The aim of this study is to present immediate and long-term results of AV preservation surgery using reshaping and decalcification, as well as the results of AV commissurotomy in the elderly.

## METHODS

From November 1987 to November 2007 in the Heart

Institute of the Faculty of Medicine at the University of São Paulo, 526 patients with isolated AS underwent surgery. Thirty-two patients (6%) underwent AV repair. All patients were over 65 years old, and the decision to go through with AV repair was decided by the surgeon.

The patients were selected from electronic medical records and then retrospectively analyzed by a systematic review of medical records. We analyzed the immediate and long-term results, the echocardiographic follow-up performed by the cardiologist, and the clinical follow-up. The clinical follow-ups were performed through outpatient consultations and phone interviews.

The morbidity and mortality related to valve surgery were defined according to the *Guidelines for Reporting Morbidity and Mortality After Cardiac Valvular Operations* [14]. Survival curves were calculated using the Kaplan-Meier method. The linear rates of the events are expressed by percentage per patient/year. The study was approved by the Scientific Committee of the Heart Institute and by the Ethics Committee of the Clinics Hospital of the College of Medicine at the University of São Paulo.

The patients with coronary artery disease (in which coronary artery bypass grafting were needed) were excluded from the study in order to not affect results, because there are studies that show an increased mortality associated with coronary artery bypass grafting and AV preservation [5,15-16].

## RESULTS

The mean age was 73.3  $\pm$  4.7 years. The majority of the patients were women, with 23 female patients (71.8%). The demographic data and the preoperative characteristics are shown in Table 1.

In the preoperative echocardiogram, we noted that the average peak gradient of left ventricle/aorta (PG LV/Ao) was 76  $\pm$  28.3 mmHg, and that the mean left ventricular ejection fraction (LVEF) was 0.64  $\pm$  0.1, with eight patients with left ventricular dysfunction. The preoperative functional class according to the New York Heart Association (NYHA) in descending order was 53.1%, 21.8%, 15.6% and 0%, for the III, II, IV and I functional classes, respectively (Figure 1).

Table 1. Demographic and preoperative data

Variable	N	%
Gender		
Male	9	28.2
Female	23	71.8
Age		
65-70 years	11	34.3
71-79 years	18	56.2
>80 years	3	9.3
Comorbidities		
SAH	28	87.5
Type 1 Diabetes	3	9.3
Type 2 Diabetes	8	25
Dyslipidemia	9	28.1
Smoking	2	6.2
Ex-smoking	5	15.6
ARF	2	6.2
COPD	3	9.3
PVF	2	6.2
Carotid disease	2	6.2
Stroke	2	6.2
Hypothyroidism	3	9.3

SAH= Systemic Arterial Hypertension; ARF= Acute Renal Failure  
 COPD= Chronic obstructive pulmonary disease; PVF= Peripheral vascular failure; Stroke

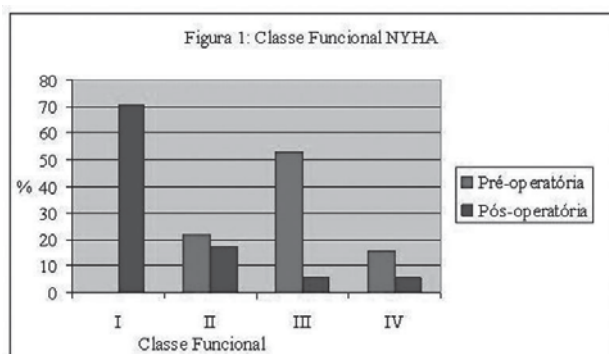


Fig. 1 – Pre- and postoperative (pré-operatória e pós-operatória) functional class (classe funcional) analysis

Four patients (15.4%) presented AV restenosis, with the postoperative echocardiogram showing a mean of PG LV/Ao 90.2 +/- 24.7 mmHg. Among the patients who presented no restenosis, the mean PG LV/Ao was 31.7 +/- 9.6 mmHg. The mean postoperative LVEF was 0.59 +/- 0.1, with six patients with left ventricular dysfunction. Five patients developed mild aortic insufficiency and two developed severe aortic insufficiency; from these two patients, the

first was reoperated at eight months and the second at 26 months, with a bioprostheses implant. Echocardiographic follow-up was performed in 27 patients (84.7%) with a mean of 15.9 +/- 20.4 months.

During the surgeries, 28 patients underwent decalcification procedures, 20 patients underwent commissurotomies, and 16 patients underwent reshaping procedures. The mean hospital stay was 15.8 +/- 17.5 days. Severe postoperative complications occurred in nine patients (28.1%), with three (9.3%) reoperations due to bleeding/tamponade, one (3.1%) after a stroke, three (9.3%) for acute renal insufficiencies, one (3.1%) after congestive heart failure and three (9.3%) for bacterial pneumonia.

There were two (6.2%) hospital deaths due to sepsis caused by hospital-acquired pneumonia and five (15.6%) deaths from late-onset pneumonia. Two (6.2%) patients died from infections and three (9.3%) from complications related to the valve.

The postoperative NYHA functional class in descending order was 70.5%, 17.6%, 5.8% and 5.8%, for the I, II, III and IV functional classes, respectively (Figure 1), with follow-up of 26 patients (81.2%).

The actuarial survival was 66.9 +/- 12.1% in eight years (Figure 2). The curve without including thromboembolism (Figure 3) and endocarditis was 90.9 +/- 8.7% and 100% in eight years, respectively.

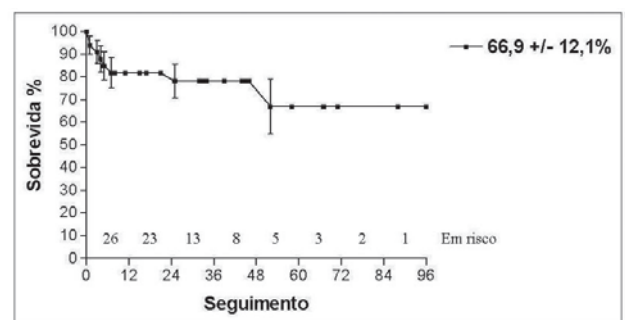


Fig. 2 – Actuarial survival curve at 8 years

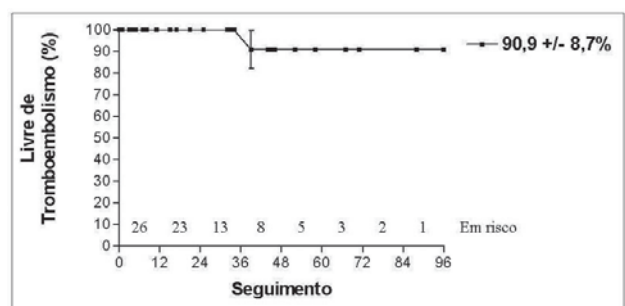


Fig. 3 – Curve free from thromboembolism

## DISCUSSION

Decalcification surgery, reshaping, and AV commissurotomy are rarely used by most surgeons, because the results of aortic valve replacement are well established. But when comparing our results with the results of valve replacement, we note similarities. Hospital mortality in some studies ranged from 3.8% to 15% [5,12-13,15-19,21,22]. The mean of these results was no different from what we found in our study, which was a mortality rate of 6.2%. However, regarding late mortality related to the valve, Tseng et al. showed 21.6%, whereas we obtained 9.3%.

The survival curve in eight years of this study showed better results than that presented by Bottio et al. in their study with Biocor biological prostheses in a general population: 66.9 +/-12.1% versus 48 +/-5%. Our results were similar to De Bacco et al.'s study, which showed a survival of 66.5 +/- 8.6. However, the study performed by Aksoyek et al. with mechanical prostheses in the elderly showed better results: 66.9 +/- 12.1% versus 84.7 +/-6% [5, 20-21].

In a study with a 12-year follow-up analysis, Braile et al. presented excellent results with the BIOPRO bovine pericardium bioprostheses, regarding both overall survival rate (91.7 +/-2.2%) and survival rate in patients over 70 years (58.1 +/- 17.2%) [22]. Studies on aortic valve repair with a larger follow-up should be performed so we can compare the long-term actuarial survival.

Regarding the curve without thromboembolism and endocarditis in eight years, we found similar results to these authors' studies [5, 20-21]. Analyzing the postoperative PG LV/Ao, we found no differences when compared to the results of Bottio et al. [20]. The postoperative quality of life can also be compared in studies of Sundt et al. Kolh and et al., in which over 80% of patients presented in NYHA I and II functional class [15, 23].

Shapira et al. retrospectively studied AV repair due to AS in adults and divided the patients into three groups: patients with congenital AS, rheumatic patients, and elderly patients, and found similar results - but with a higher rate of restenosis (24%) and an actuarial curve free of symptoms at 87% [24]. In another study, Weinschelbaum et al. prospectively analyzed the elderly and noted similar results, but with a high occurrence of restenosis and reoperation, because most patients recommended for this procedure are the elderly, those with a small aortic annulus, and those with contraindication to anticoagulation [10].

## CONCLUSION

AV preservation surgery in elderly patients with AS in this series of patients has been shown to be safe, with low morbidity and mortality rates, a satisfactory survival rate at eight years, and an improvement in functional class in the follow-ups of the presented patients.

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